



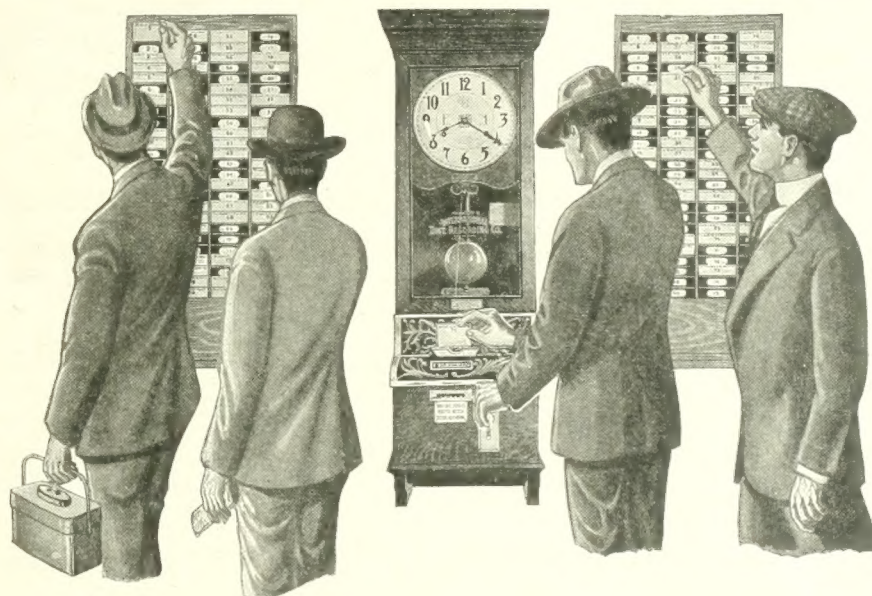
# CANADIAN MANUFACTURING AND MANUFACTURING NEWS

A weekly newspaper devoted to the manufacturing interests, covering in a practical manner the mechanical, power, foundry and allied fields. Published by the MacLean Publishing Company, Limited, Toronto, Montreal, Winnipeg and London, Eng.

Vol. XIV

Publication Office: Toronto, December 2, 1915

No. 23



## What can the Manufacturers of Canada expect from The International Time Recording Company?

To have any kind of factory, warehouse or office equipped with time recording apparatus that will automatically keep an always-legible, unchangeable and accurate record of each employee's time. Such record serves as an original pay-roll entry.

To have any factory or institution equipped with Secondary Clocks controlled by a Master Clock with full electrical equipment.

To have any plant equipped with the best mechanical labor-cost-system in the world, with special reference to the "elapsed time" Recorder which gives at a glance the actual time spent on any individual job.

To get the benefit, free of charge, of the advice and experience of a Company with 30 years' experience, and the largest output of Time Recording equipment and the longest list of satisfied users in the world.

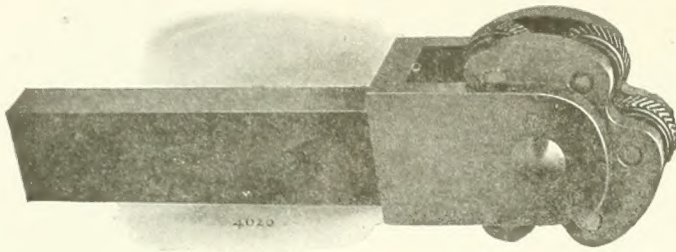
Remember: "It costs more to be without the International Time Recording System than it does to buy it."

**International Time Recording Co. of Canada, Limited**  
Ryrie Bldg., Corner Shuter and Yonge Sts., TORONTO

F. E. MUTTON,  
General Manager

Montreal Representative: CHARLES COLE  
Cartier Bldg., McGill and Notre Dame Sts., Montreal, Que.



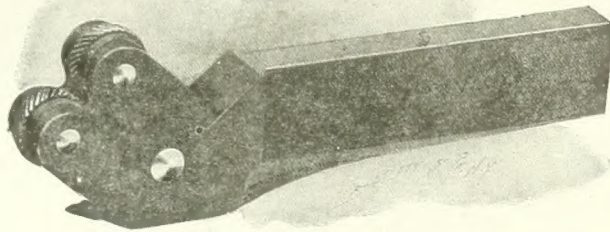
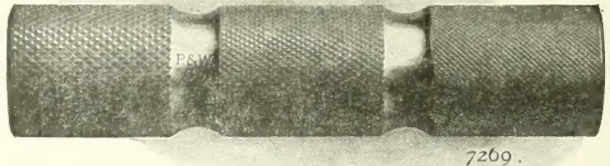


## Don't Waste Time Changing Knurls

and don't be bothered with three holders when one will do.

### Use the P. & W. "Three-in-One" Lathe Knurling Tool

Carries three pairs of knurls, making it three distinct knurling tools in one.



### Coarse, Medium and Fine

The three pitches of knurls which we carry in stock are all combined in this one tool.

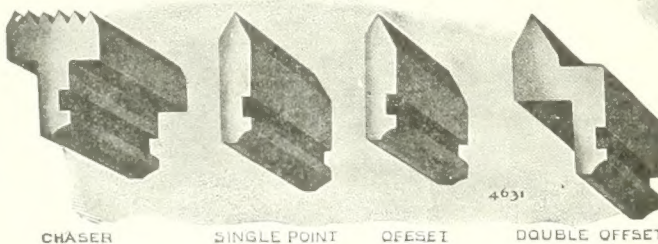
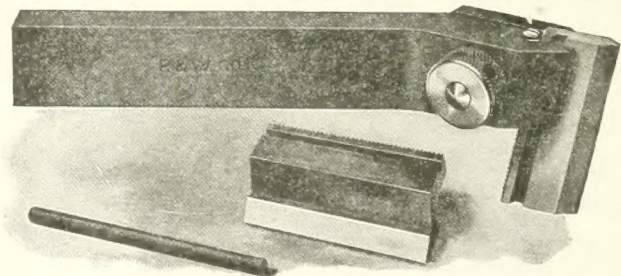
Uses same knurls as regular Lathe Knurling Tool shown opposite.

## Same Holder for Chasers and Single Point Cutters and the change can be made in a jiffy on the

## P. & W. Threading Tool

### A FEW OF ITS ADVANTAGES

1. Threads can be cut very close to a shoulder.
2. Tools are sharpened by simply grinding off top of cutter.



CHASER

SINGLE POINT

OFFSET

DOUBLE OFFSET

3. Combines economy with all features essential in a threading and forming tool.

4. Cutters have 15° clearance, which experience has taught gives the longest wear in various metals.

Place a trial order with our nearest store

## PRATT & WHITNEY CO. OF CANADA, LIMITED

DUNDAS  
Ontario

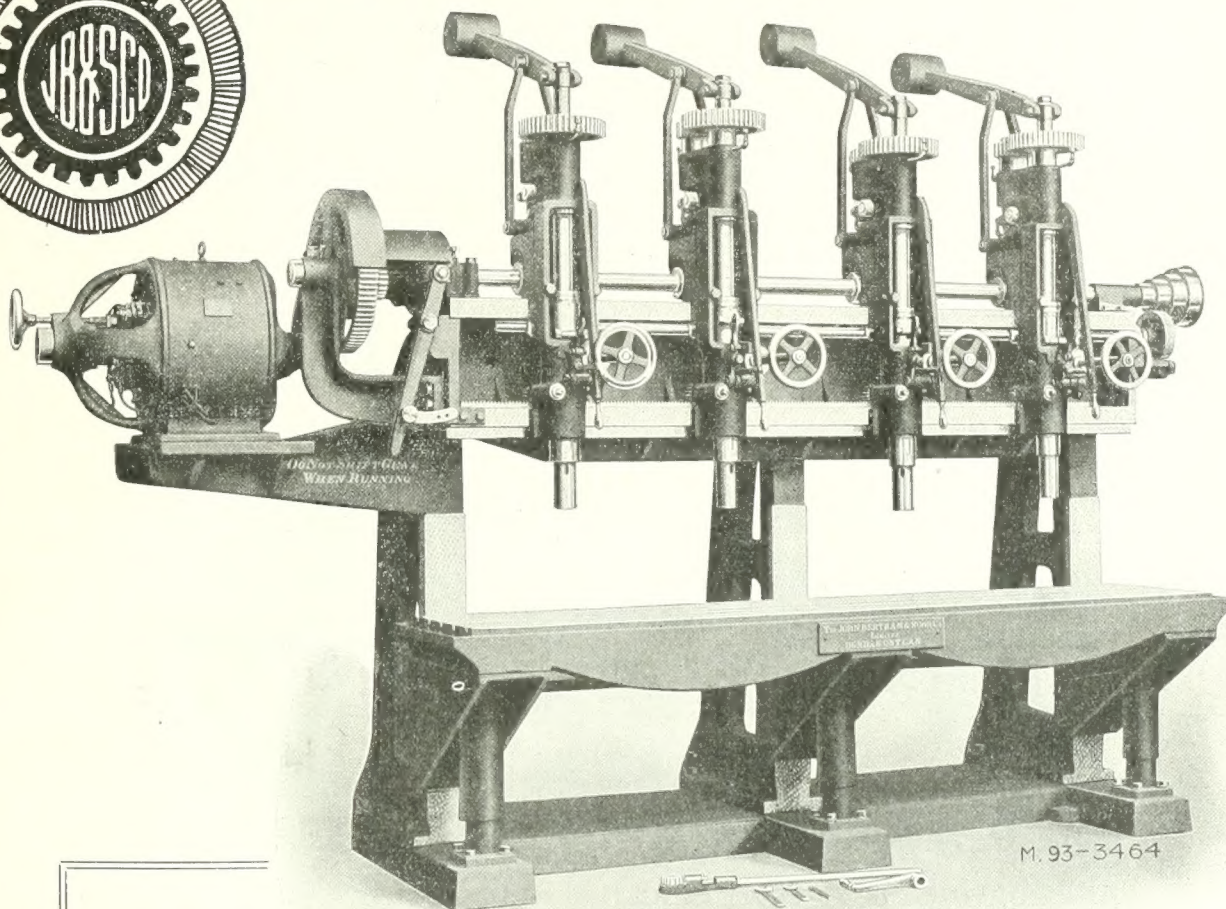
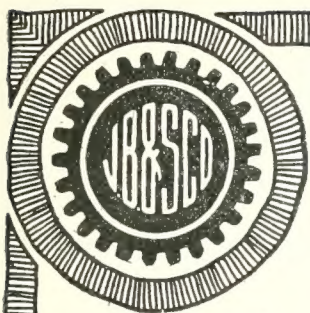
MONTREAL  
723 Drummond Bldg.

WINNIPEG  
1205 McArthur Building

VANCOUVER  
B.C. Equipment Co.

*The advertiser would like to know where you saw his advertisement—tell him.*





# Multiple Drills

*OF EVERY DESCRIPTION*

**Bertram Four-Spindle Multiple Drilling Machine for Locomotive and Other Work.**

SIMULTANEOUS OR INDEPENDENT FEEDS WITH INDEPENDENT KNOCK-OFF FOR EACH HEAD AND CLUTCH DRIVE FOR EACH SPINDLE.

CAPACITY, FOUR 2-INCH HOLES IN STEEL.

Drop us a line for photographs and full particulars.

## The John Bertram & Sons Co. Limited

Dundas, Ontario, Canada

MONTREAL  
723 Drummond Bldg.

VANCOUVER  
609 Bank of Ottawa Building

WINNIPEG  
1205 McArthur Bldg.

*The advertiser would like to know where you saw his advertisement—tell him.*



# The Publisher's Page

By B.G.N.

## Have You Idle Machinery?

¶ If you have equipment for which you have no further use, why pay depreciation charges on it? Advertise it in CANADIAN MACHINERY'S classified ad. page, and turn it into CASH.

¶ Machine tools of almost every description are in demand at the present time. A "for sale" ad. will bring you and your probable buyers together quickly and inexpensively.

¶ *We will reach your man by the shortest possible route.* He may be in Ontario or he may be in the West, or again he may be in the Maritimes. No matter where he is, if there is a buyer for your unused equipment we will find him.

### RATES FOR CLASSIFIED ADVERTISING

First insertion	-	-	Two cents per word
Subsequent insertions	-	-	One cent per word

¶ It pays to fully describe what you have for sale. Rates for regular display advertising upon request.

**CANADIAN MACHINERY**

143-153 University Avenue

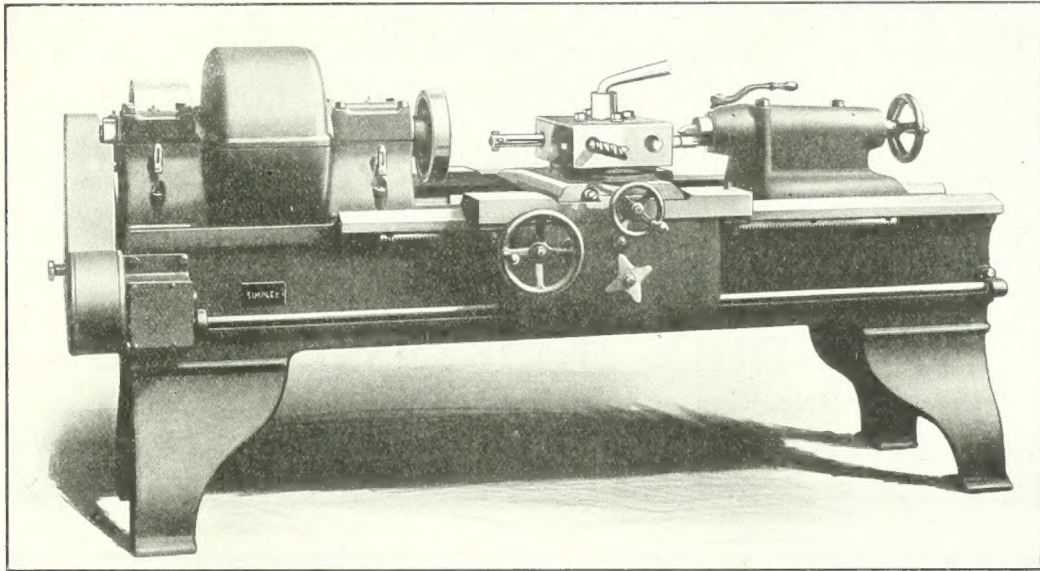
TORONTO



# No. 1 SIMPLEX

Single Purpose Heavy Duty Geared Head Single  
Pulley Drive Shell Lathe

*For machining 6-inch Shells and smaller*



Reduced Swing Over Vs—16 inches.	Bed Length 8 feet or over
Crated Weight Plain Lathe,	3,550 lbs. approx.
Crated Weight, with Attachments,	5,000 lbs. approx.

## ATTACHMENTS

For *Interior* Operations we recommend Four-bar Steel Carriage  
Turret and Forming Attachment.

For *Exterior* Operations we recommend Four-tool Turret Tool  
Post, Forming and Waving Attachments.

No. 2 Simplex lathe is suitable for similar operations on  
shells, up to and including 12-inch.

## KELLOGG & COMPANY

No. 1204 Traders Bank Building

TORONTO, CANADA

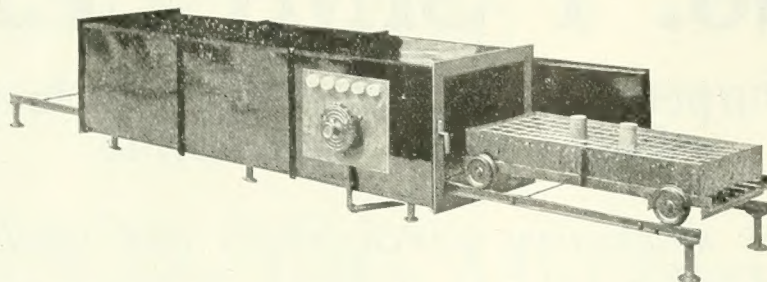
*The advertiser would like to know where you saw his advertisement—tell him.*



# HOSKINS

TRADE MARK REGISTERED

Made  
in  
Canada



23 Now  
in Use  
in Canada

## ELECTRIC BAKING OVENS

FOR BAKING THE VARNISH IN HIGH EXPLOSIVE SHELLS

The electric oven is the most satisfactory for this line of work. The absence of injurious gases and fumes insures protection of the varnish. The electric unit runs almost the full length of the oven, insuring perfect heat distribution. The temperature control is simple, and the temperature of the oven can be properly regulated to within a few degrees. The HOSKINS Electric Oven is built on the same lines as the HOSKINS Electric Furnaces. This efficient construction makes possible the operation of the oven with from 20% to 30% less current than other types of electric ovens. Send for bulletin No. C-106.

### CANADIAN HOSKINS LIMITED

Electric, Gas and Oil Furnaces and Pyrometers.

Eastern Office: 112 St. James St., Montreal, Que. General Office and Factory: WALKERVILLE, ONT.

## Two Cuts at One Time

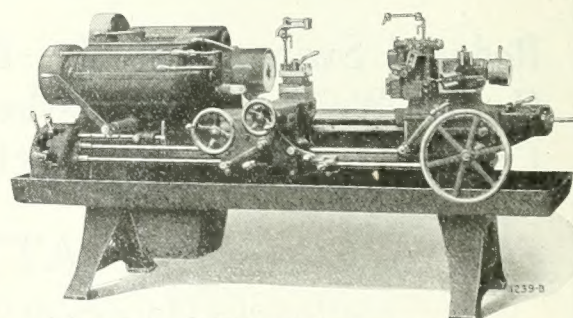
The ability to face, undercut or neck with the square turret while boring or turning with the hollow-hexagon turret contributes largely to the time-saving and economical output of the

### Universal Hollow-Hexagon Turret Lathes

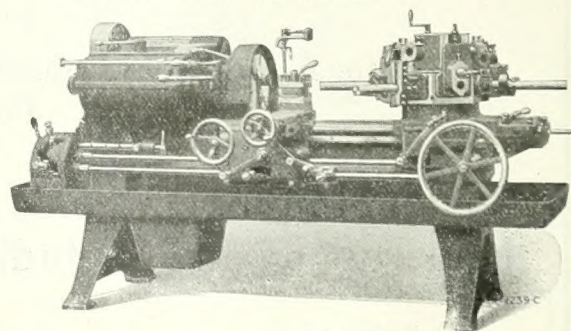
Separate feed shafts, each with ten individual feeds, operate the carriage and turret saddle independently, and provide the exact feed required for each.

And to this great advantage are added the other essentials for rapid and accurate production—excess power, extreme rigidity, great adaptability, and a power rapid traverse that saves time and conserves the energy of the operator.

Without obligation, ask us to show the saving on one of your typical jobs. Send blueprints with rough and finished samples.



No. 2-A—With "Bar Equipment"



No. 2-A—With "Chucking Equipment"

**THE WARNER & SWASEY CO., Cleveland, Ohio, U. S. A.**

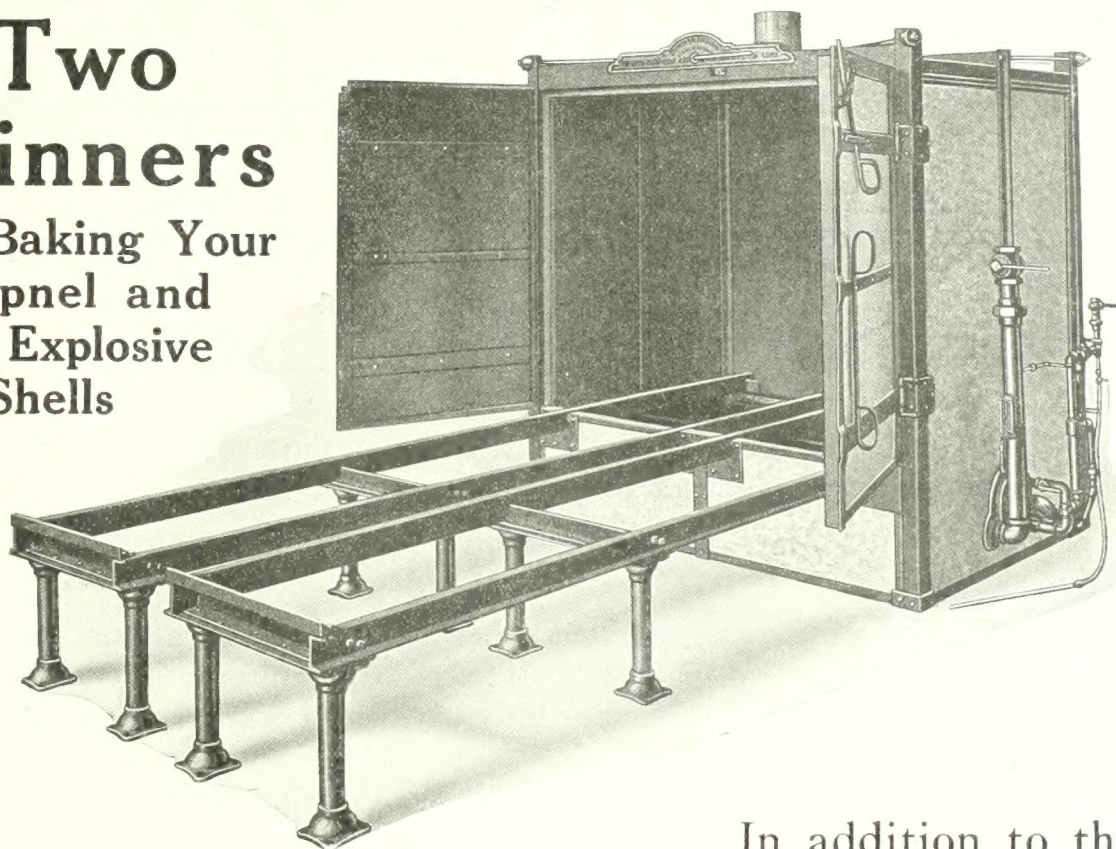
Canadian Agents: A. R. Williams Machinery Company, St. John, Toronto, Winnipeg, Vancouver; Williams & Wilson, Montreal.

*The advertiser would like to know where you saw his advertisement—tell him.*

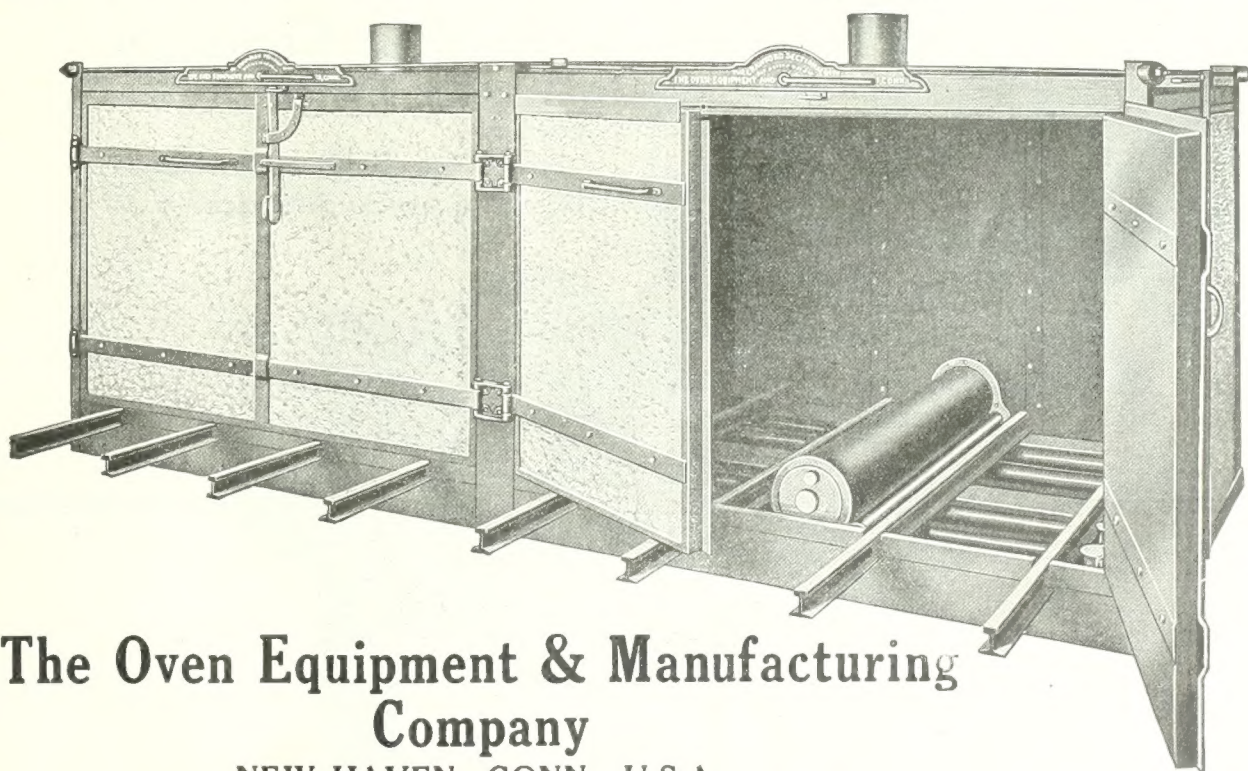


# Two Winners

for Baking Your  
Shrapnel and  
High Explosive  
Shells



In addition to the constructing of Special Oven Equipment we design and build trucks suitable for handling any size of shell.



## The Oven Equipment & Manufacturing Company

NEW HAVEN, CONN., U.S.A.

Canadian Representatives: THE A. R. WILLIAMS MACHINERY COMPANY, LIMITED, TORONTO, CANADA

*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*



# SOUTHWARK

## High-Speed Hydraulic Banding Machines

Splendid producers, operating with exceptional speed and conforming with standards of accuracy.

We are prepared to furnish machines for banding up to 15-inch shells.

These Presses may be operated either with an individual pump or from an accumulator; or with a hydraulic pneumatic intensifier where air pressure is used for intensifying the water pressure in the press cylinders.

We build a complete line of Hydraulic Machinery for all purposes, including Presses, Pumps, Accumulators, Intensifiers, Leather Packings, Valves, Gauges, Cranes, Hoists, Jacks, Riveters, etc.

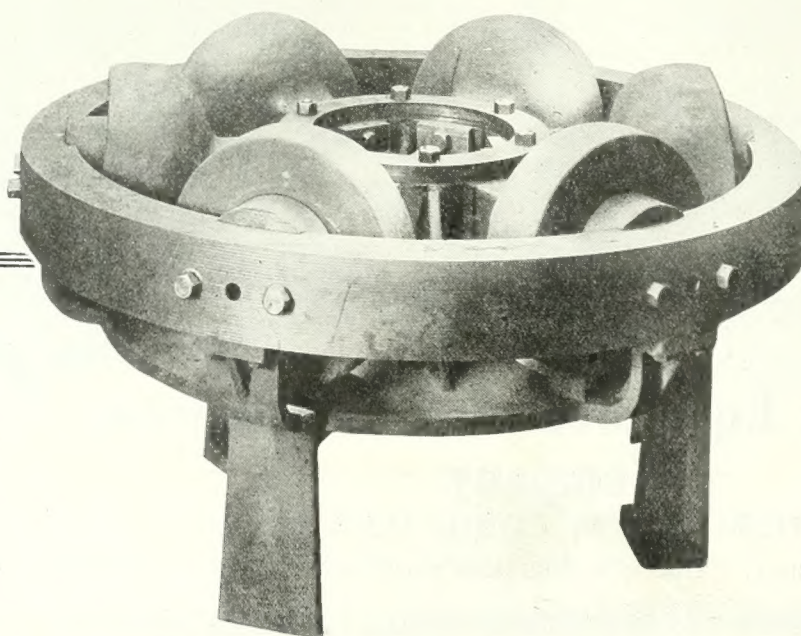
**Southwark Foundry & Machine Company**  
PHILADELPHIA, PA.

FOUNDED 1836

Old Colony Building, Chicago

Brown-Marx Building, Birmingham

"First Builders of Large Centrifugal Pumps in America."



*The advertiser would like to know where you saw his advertisement—tell him.*



# Hydraulic Nosing Presses For All Types Of Shells

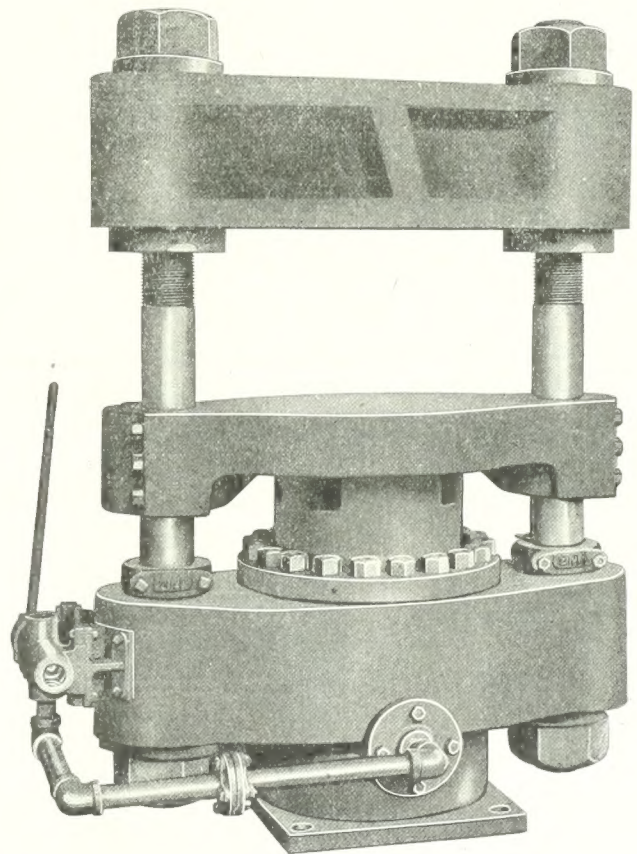
New Design For 5 in. and 6 in. Shells  
Just Out.

---

HYDRAULIC  
PUMPS AND  
ACCUMULATORS.

ALL STYLES  
AND SIZES.

---



FULL INFORMATION SENT UPON  
REQUEST.

**Canadian Boomer & Boschert Press Co.**

18 Tansley St.

Cable Address  
—PressCo.—

Limited  
**Montreal**



# HYDRAULIC PRESSES

For Piercing and Drawing

## SHELLS AND PROJECTILES

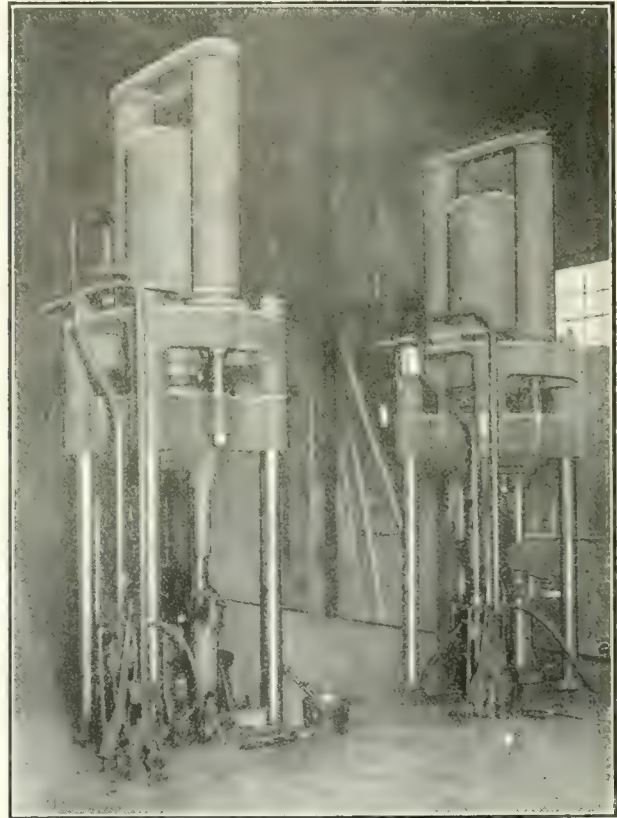
Our facilities for manufacturing Hydraulic Presses assure you a product of very high quality and efficiency at reasonable cost.

Write us now. We are in a position to give you **PROMPT DELIVERY.**

**The William Cramp & Sons Ship and  
Engine Building Company**

PHILADELPHIA, A.

### DRAWING PRESSES

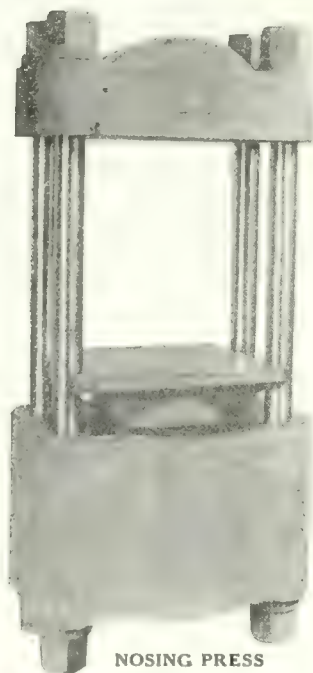


# PRESSES

**Pumps  
and  
Accumulators**

**FOR ALL  
PURPOSES**

**Made in  
Canada**

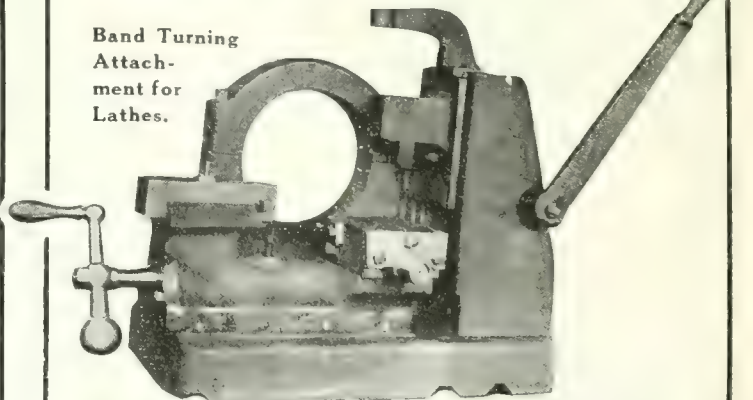


NOSING PRESS

**WILLIAM R. PERRIN, Limited**  
TORONTO

## A Time-Saver for Turn- ing Copper Band on Shells

Band Turning  
Attach-  
ment for  
Lathes.



This attachment will fit any engine lathe, and with its use you can turn the copper band on Shrapnel Shells down to size required and burnish them *all in one operation.*

With this device we will guarantee an output of

**50 Turned Copper Bands per Hour**

Used with a specially constructed steel chuck, casting of which can be finished on the lathe on which the attachment will be used.

Castings are supplied by us.

WRITE FOR PARTICULARS.

**LYMBURNER LIMITED**

**5-15 Commissioners St. Montreal, P. Que.**

*The advertiser would like to know where you saw his advertisement—tell him.*



# High Duty Q M S Cold Metal Saw

## Ready for Delivery December 1, 1915

Manufacturers of shells will find this announcement of particular interest to them at the present time. Now is the time to order one of these saws and be assured of prompt delivery.

**I**N designing the new High Duty QMS Cold Metal Saw it was intended that the best obtainable blades be driven at their maximum efficiency. The machine is arranged so that a variable peripheral speed of saw blade and a variable feed can be obtained.

The change from one feed to another is a gradual one, made possible by a novel design of friction and gear feed. Control is centered at one point convenient to the operator. The machine is arranged for quick power return, and, if desired, can be supplied with automatic clamp and stock trolley.

## The Q M S Company

SALES AGENT

VULCAN ENGINEERING SALES CO.  
2065 Elston Ave., CHICAGO, U. S. A.

Agent for

Hanna Engineering Works, Mumford Molding Machine  
Company, J. C. Busch Company



especially  
adapted  
for  
Grinding  
SHELLS

# "Modern" 12' x 24" Self-Contained Grinding Machine

This is a powerful, rigid and effective machine that will give you an extra measure of shell production.

Large diameter, wide face wheel with powerful drive.

Automatic feed, without traversing the table, where required.

Absolute central control of all levers and hand wheels.

Single constant speed drive.

Write for full details.

USED BY A LARGE NUMBER OF SHELL MAKERS IN CANADA.

It comes equipped for all classes of straight and taper cylindrical work.

Send for blueprints and estimates.



## Modern Tool Company

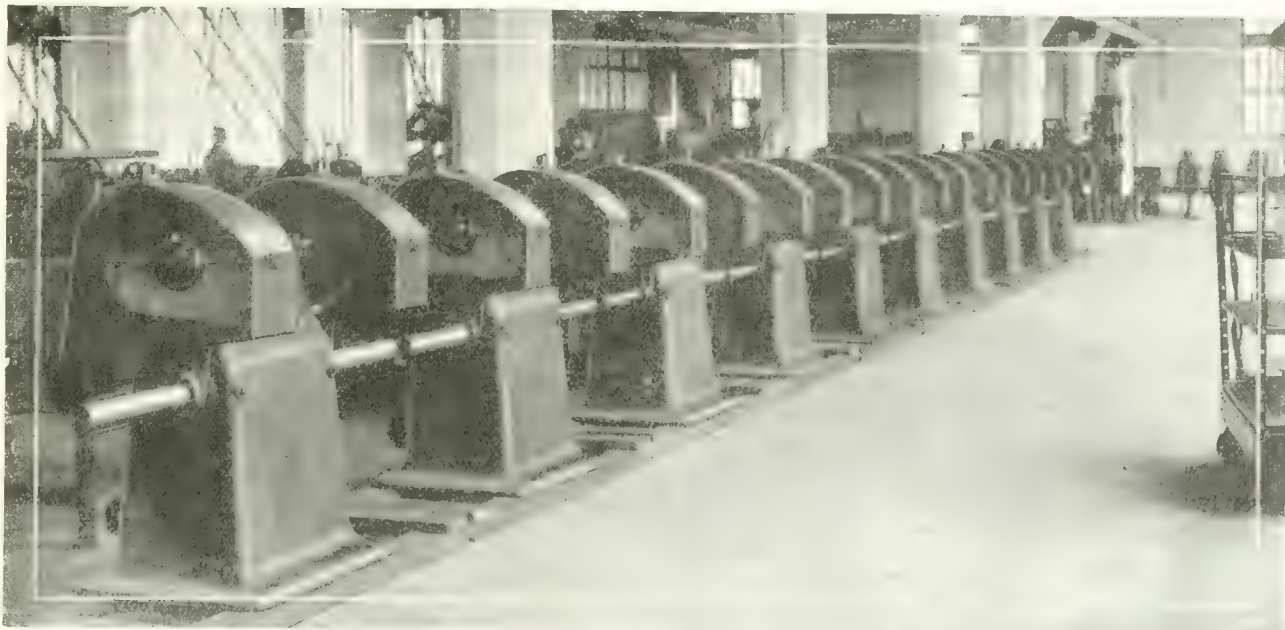
Main Office and Works:

State and Peach Streets, Erie, Penn'a

Canadian Agents: Rudel-Belnap Machinery Co., Toronto and Montreal

*The advertiser would like to know where you saw his advertisement — tell him.*





PART OF A SHIPMENT OF BESLY SHELL GRINDERS.

## Invaluable for Many Flat Surfacing Operations On

2.95" or 75 Millimeter

3"

3.29"

3.31" or 85 Millimeter

4.5"

4.72" or 120 Millimeter

## SHRAPNEL and HIGH EXPLOSIVE SHELLS

Below are some of the operations being accomplished on BESLY SHELL GRINDERS faster and better than by any other method:

### ON SHRAPNEL SHELLS:

Facing nose

Facing ends for centers

Removing stub ends left for centers

Facing base, flat, smooth, and square.

### ON HIGH EXPLOSIVE SHELLS:

Surfacing inner face of base plate or gas plug, flat or cambered, and square with body.

Facing base of shell and gas plug after gas plug has been inserted, including removing the square projection from gas plug, if required.

## BESLY SHELL GRINDERS ARE

1st—Inexpensive in first cost and upkeep

2nd—Three to twenty times faster than other tools

3rd—Can be operated by cheap, easily replaced labor

4th—Require practically no tool-making upkeep expense for cutters

5th—Produce work of extreme accuracy in flatness, angularity, size and finish.

We are supplying specially-equipped machines for the following shell work:

Facing diaphragms for large shells.

Facing and burring copper bands for shrapnel and high explosive shells.

Facing to length and beveling open end of cartridge cases.

If interested, write us to-day.

We have equipped many munitions factories in this and foreign countries.

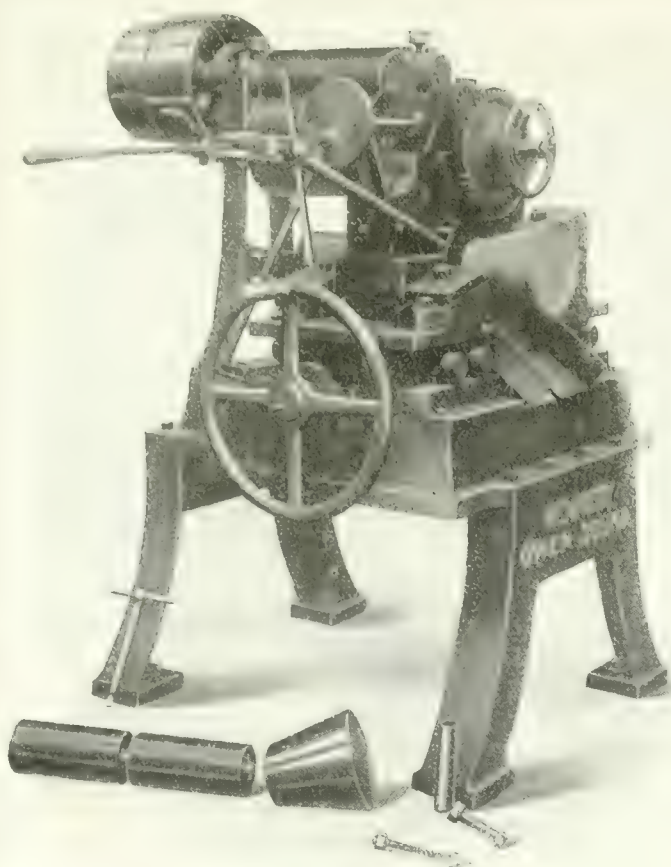
Write to-day for full information.

### Charles H. Besly & Company

120 North Clinton St., Chicago, U.S.A.

Specialists on Flat Surface Grinding





## CUTTING-OFF MACHINES

### Quick Delivery

For cutting off and trimming  
4.5" to 9.2" Shell Blanks and  
Forgings.

Floor space approximately 4 ft.  
square.

Will cut crooked and short  
ingots. No loose collars to put  
on billets.

1 Helper to every 3 or 4 ma-  
chines.

THE  
**Wm. Kennedy & Sons**  
LIMITED  
OWEN SOUND

## Gorton Heavy Duty Cutting-Off Machine

**No. 2-E**

The principle of construction of the Internal toothblade type of machine shown here admits of a cutting speed which cannot be approached by machines of the ordinary type.

Vibration is so completely eliminated that the output of this machine is controlled by the efficiency of the Tool Steel.

For instance, at present it is not practicable to maintain the maximum speeds of which this Cutting-Off Machine is capable with present Tool Steels.

The No. 2-E Gorton Heavy Duty is pre-eminently suitable for constant, hard service, and capable of being operated continually month in and month out without the excessive repairs ordinarily placed on such machine.

Especially suitable for Rolling Mills, Car and Locomotive Works, Engine Builders, Electrical concerns, and Machine builders generally.

Capacity 3 in. to 13 in. rounds; 3 in. to 9 1/4 in. squares; and for any other size or shape that can be contained within a 13 in. circle.

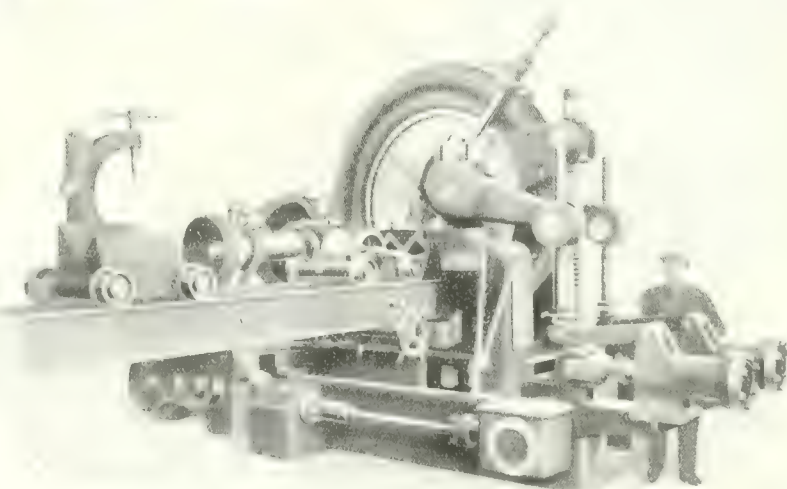
For catalog and full particulars write.

**George Gorton Machine Co.**

Manufacturers of Engraving Machines  
and Heavy Duty Cutting-off Machines

**RACINE, WIS., U.S.A.**

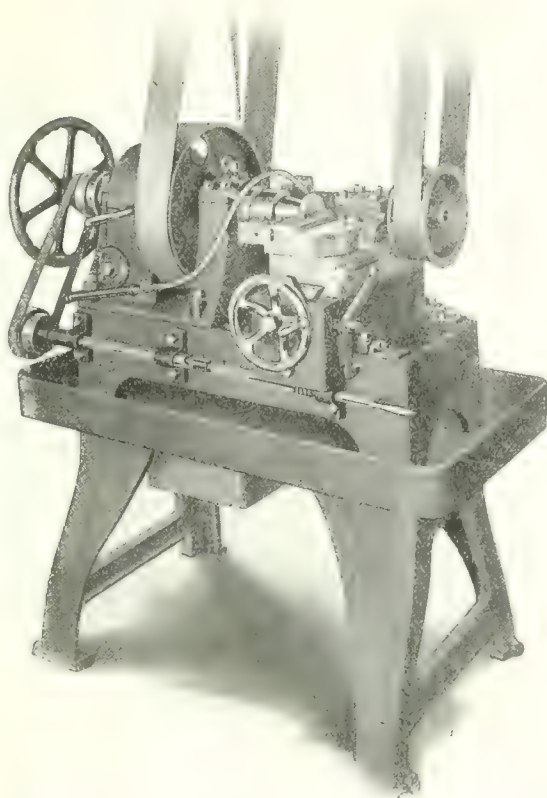
Cable Address: "Gorton, Racine." Use A.B.C.  
Code (4th edition) or Western Union Code  
(Universal edition)



FRONT VIEW GORTON NO. 2-E HEAVY DUTY CUTTING-OFF MACHINE—capacity 13 in. rounds and less. Photograph shows the Standard Machine, self-contained, motor driven, with power, dumping front and rear, and stock rack No. 157-1. Net weight without motor, 55,000 pounds.

*The advertiser would like to know where you saw his advertisement—tell him.*





## THE BANFIELD PLUG MILLER

**T**HIS machine is especially designed for finishing base plugs, turning the outside diameter, finishing the face with any camber desired, and milling the thread, all in one chucking, the complete plug being finished in three minutes by unskilled labor.

The machine is equipped with quick draw in collet. Drive pulley 16" x 4" with bronze bush having cut jaw clutch for turning and facing. Bronze worm gear 7:1 to 1 ratio, with cut jaw clutch for milling, driven by 10" x 1 1/2" flanged pulley. The milling cutter is driven by an 8" x 2 1/2" flanged pulley. Tool post carriage is equipped with power feed (two speeds) having automatic stop. Power feed pump with relief valve driven from worm shaft (*all drives direct from main line shaft*). Rigidly built, simple and economical to operate.

BUILT EXCLUSIVELY BY

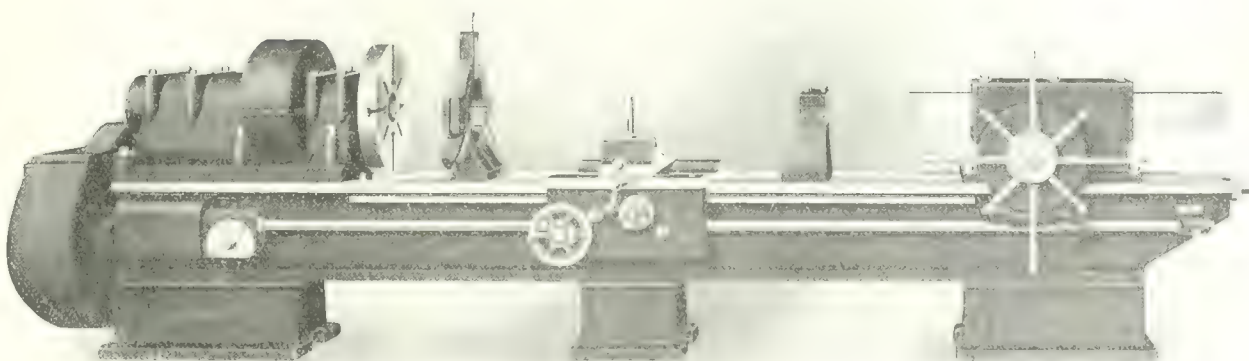
**Edwin J. Banfield**

STAIR BUILDING,

TORONTO, ONTARIO

For Turning, Facing and Milling the Thread on  
Gas Check Plugs for High Explosive Shells.

## Barrett 25" Heavy Duty Projectile Boring Lathe



A thorough tried-out proposition for boring and facing projectiles and shells  
up to 12 inches.

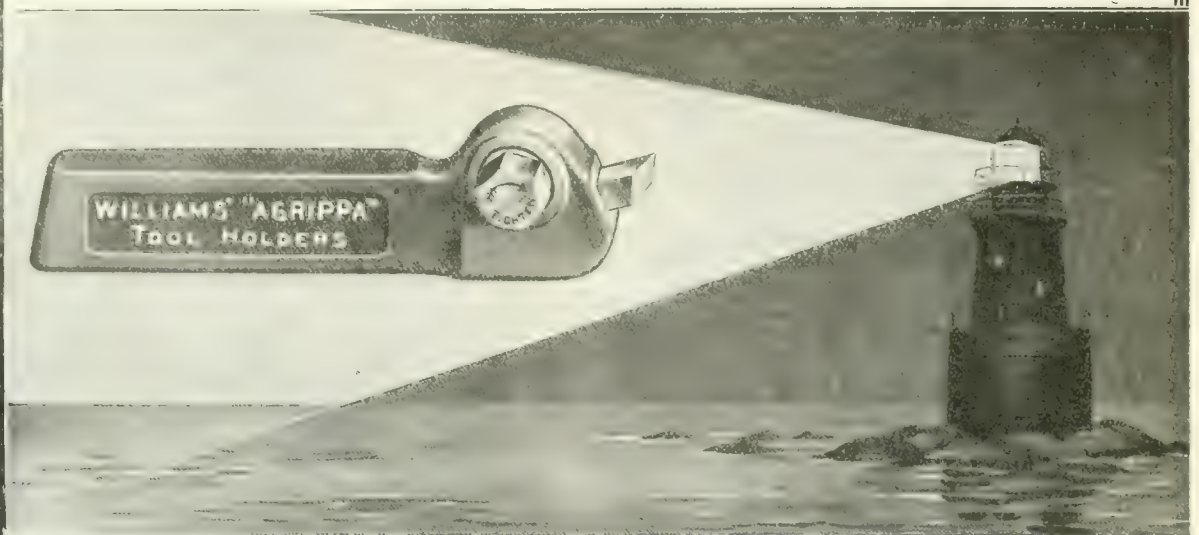
LET US SEND YOU SPECIFICATIONS AND FULL PARTICULARS.

**Barrett Machine Tool Co., Meadville, Pa., U.S.A.**


*If what you want is not advertised in this issue consult the Buyers' Directory at the back*

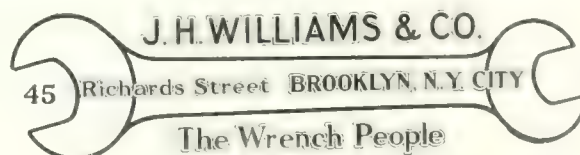


## Let a score of reasons emblazon their score



### "THE HOLDERS THAT HOLD"

1. They were designed and produced **after** the demands of the High Speed Age upon lathe tools were fully established and understood.
2. They can be made to grip tighter than other tool holders without inviting their destruction.
3. Their protected fastenings make them immune from abuse.
4. Their fastenings provide reserve power—the greater the pressure the tighter the lock
5. They are made of selected stock, scientifically refined and treated by trained experts.
6. They prevent lost motion by obviating breakage of fastenings.
7. They are steady workers who never quit until the job is completed.
8. They never lose their heads.
9. Nothing upsets them.
10. The stripping of threads is impossible.
11. They are well balanced; each portion is designed for the strain it bears.
12. Their dependability is assured—the  secures it.
13. They are made and sold to secure full commission to the dealer, full profit to the owner and full pay to the workmen.
14. Their successful career has not turned their heads; we provide a **suitable** wrench for that purpose.
15. They permit a pound of steel to perform the work of many pounds of solid forged tools.
16. The cam fastenings permit quicker locking and releasing of tools in turning, threading, cutting-off and side holders.
17. The lockable spring head of the Threading tool permits the finest threading in finishing or heavy roughing cuts in preliminary operations.
18. The cutting-off tool is made as effective for **side** work by interchangeable blades.
19. Within its range the boring tool takes any commercial size or shape of bar without shims, and provides for varied adjustment of straight or angular cutters.
20. The planing tool with 36 angles of adjustment provides perfect seating of cutters with uniform locking pressure in all positions.



Factories:  
BROOKLYN,  
BUFFALO, **N.Y.**

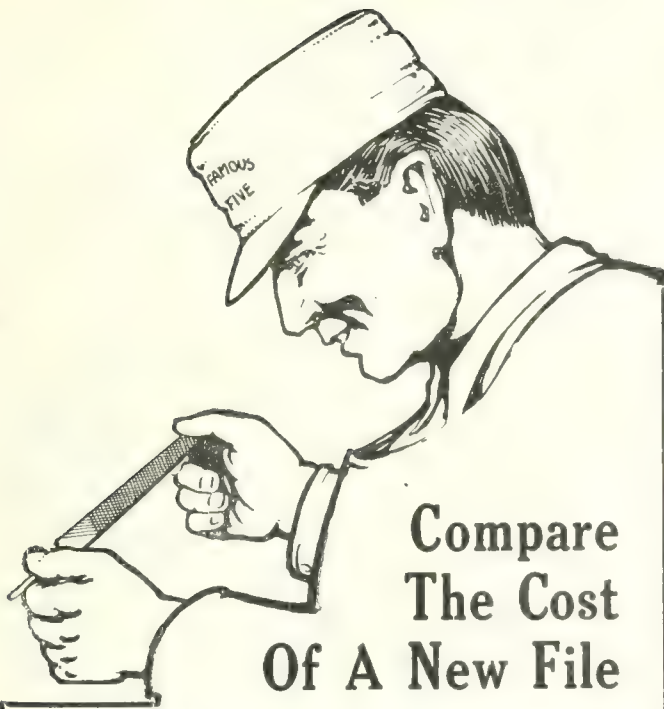
Western Office and Warehouse:  
40 SOUTH CLINTON STREET, CHICAGO, ILL.

**CATALOGUE FOR  
THE ASKING**

  
**Their Score**

*The advertiser would like to know where you saw his advertisement—tell him. •*





## Compare The Cost Of A New File

with the time your men are wasting using a file when it is half worn.

- It won't take long for you to figure out that the cost of a new file is negligible in comparison to the time saved in labor.

Teach your men to throw away their files when they are half worn, and replace them with the files favored by 90% of Canada's file users.

## KEARNEY & FOOT GREAT WESTERN AMERICAN ARCADE GLOBE

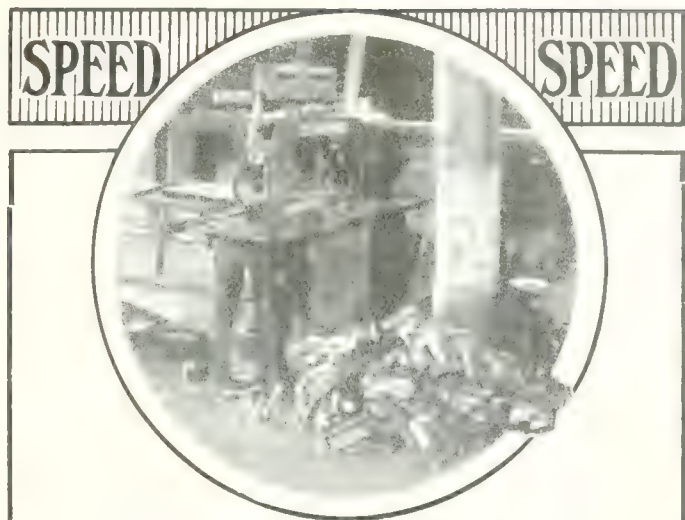
(Made in Canada)

They are the product of 50 years' experience in file-making, and are as uniform as the most scientific knowledge and up-to-date machinery can make them.

Sufficient indication of their popularity is a yearly output of 60,000,000 files.

*Your FREE copy of "File Philosophy" is waiting for you. Just drop us a card.*

**Nicholson File Company**  
Port Hope (Dealers Everywhere) Ontario



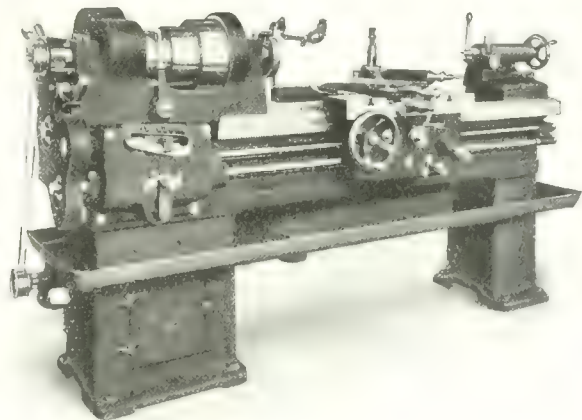
This pile of 1-inch square steel bars was cut in nine hours with a  
***Racine Metal Cutter***  
with ONE BLADE at a blade expense of six cents.

You will profit by learning all about the Racine features that make records like this possible.

Used extensively in Canadian plants. One Canadian Steel Company is using 120.

We'll gladly put you in touch with users and send full details.

**RACINE TOOL & MACHINE COMPANY**  
15 Melbourne Ave., Racine, Wisconsin, U.S.A.



## THE "OLIVER" 16-INCH HEAVY DUTY ENGINE LATHE

POWERFUL  
DOUBLE BACK GEARED  
QUICK-CHANGE GEAR BOX  
THREAD CUTTING

EARLY DELIVERIES

Write for Engine Lathe Bulletin No. 47  
Write for Turret Lathe Bulletin No. 47T

**Oliver Machinery Co.**  
Grand Rapids, Michigan, U.S.A.

*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*



## BEATH HOISTING AND CONVEYING MACHINERY

Overhead Runways  
and Trolleys,  
Cranes, Derricks,  
Chain Blocks,  
Electric Hoists and  
Trolleys,  
Rope Blocks,  
Friction Hoists,  
Hydraulic and Hand  
Power Ash Hoists,  
Coal Handling  
Machines,  
Gravity Roller and  
Spiral Conveyors.

We Are Installing

## BEATH OVERHEAD TRACKS, TROLLEYS AND HOISTS

For Hoisting and Conveying

### 5-in., 6-in., 8-in. and 9.2-in. Shells

in the receiving, forging, machinery and shipping departments. Beath Overhead Runways require no floor space and are particularly adapted for this service.

The weight of these Shells have caused a new problem in handling that will have to be met and overcome by manufacturers of these heavier types of explosives.

*Let our engineering department show you how a Beath Overhead Runway can be made to fit into your requirements.*

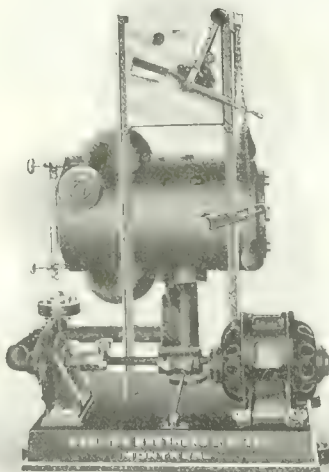
## W. D. Beath & Son, Limited

ENGINEERS AND MANUFACTURERS

20 Cooper Avenue

TORONTO

## Top-Notch Power Pump Service



Electrically Controlled Pump and Receiver.

This is the result of every installation of our power pumps.

Our long experience in this work enables us to guarantee first-class service in every respect.

If you are needing or expect to be needing anything in this line, remember **we make them for every service.**

Drop a line to our engineering department—it is in charge of experts who will gladly consult with you with regard to your requirements.

## DARLING BROS., LIMITED

Head Office and Works: MONTREAL

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# 2½ Million Bought

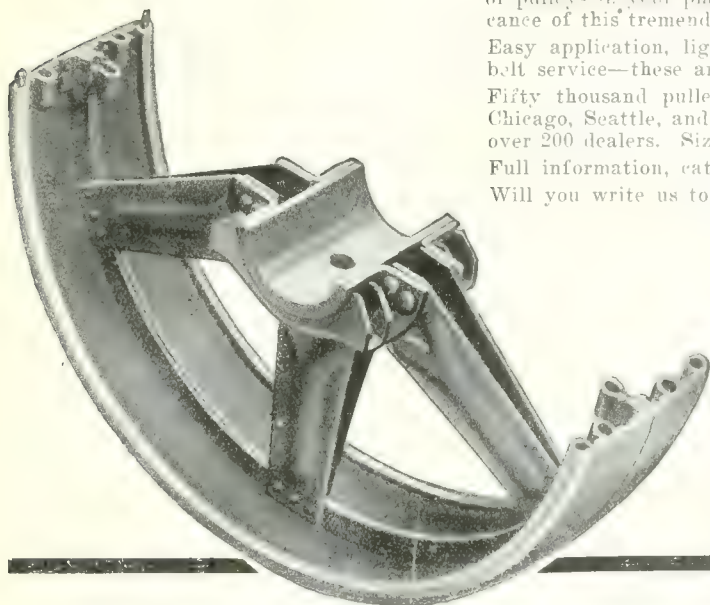
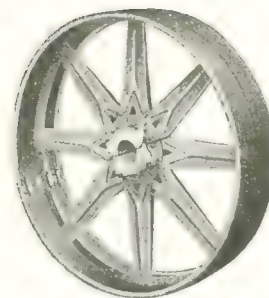
The mechanical advantages of AMERICAN Steel Split PULLEYS, and the pulley service that they make possible, have caused pulley users to buy over 2½ million. More AMERICAN Pulleys are bought than of any other one make.

Just consider for a minute the confidence that this reflects. Estimate the number of pulleys in your plant that might be steel split, and then you'll get the significance of this tremendous output.

Easy application, light weight, minimum air fanning, unusual strength, double belt service—these are some of their characteristics.

Fifty thousand pulleys stocked for immediate delivery at New York, Boston, Chicago, Seattle, and at the factory, besides thousands of others in the stores of over 200 dealers. Sizes 3" to 120".

Full information, catalogs and prices will be sent promptly on request. Will you write us to-day?



## AMERICAN PULLEY COMPANY

4206-60 Wissahickon Ave., Philadelphia, Pa.  
New York Boston Chicago Seattle

WILLIAMS & WILSON, LTD., Montreal

THE A. R. WILLIAMS MACHINERY CO., LTD.  
St. John, N.B. Toronto Winnipeg Vancouver

# AMERICAN STEEL SPLIT PULLEY



## Electric Traveling Cranes

Any span or capacity.

For foundry and every service.

Send for Catalog 110.

Complete  
Foundry  
Equipments



Cranes  
of all  
Kinds



Scores of our belts have been in service under the severest conditions for over thirty years. They thus ensure a low cost of maintenance which, combined with a low initial cost, means the greatest possible efficiency.

It is time you gave us a trial order.

Let us help you solve your belting problems.

Main Belting Co. of Canada  
Limited

10½ St. Peter St., - MONTREAL

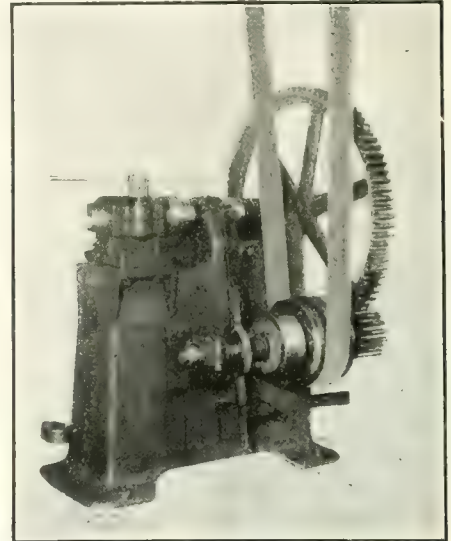


# Holden-Morgan Mechanical Plug Wrench

*For Screwing the Base Plugs Into Shells*

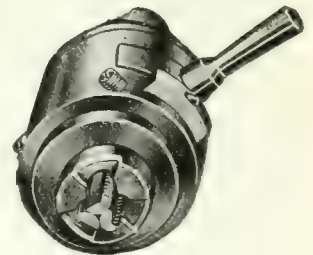
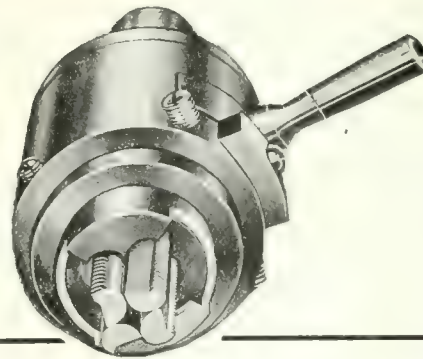
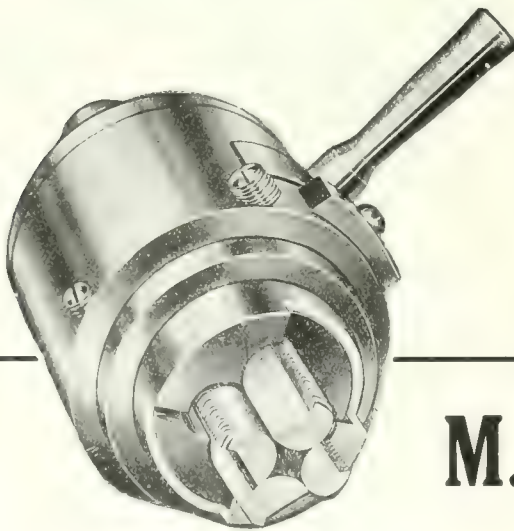
Output 120 per hour. One machine with an operator will do the work of four men. Friction device adjustable, and can be set for any required tension, and when set the pressure applied will not vary from the desired adjustment.

Direct driven, no countershaft needed. The plug is screwed in and tightened up entirely by mechanical action, and therefore eliminating the variations that result from hand work.



**THE HOLDEN-MORGAN COMPANY, LIMITED**

539 RICHMOND STREET WEST, TORONTO



## M.E.C. Collapsible Taps

*Big Favorites of Shell Makers*

Manufacturers of shrapnel shell parts find them invaluable because of their convenience, rigidity and accuracy. Many of Canada's largest manufacturers of munitions have adopted them as a practical way of reducing cost and increasing output, after putting them to a severe test.

Would you like to hear what users have to say? We'll be glad to put you in touch with our Canadian customers. Drop us a line now for our proposition—it's a liberal one that's sure to appeal to you.

**Manufacturers Equipment Company**

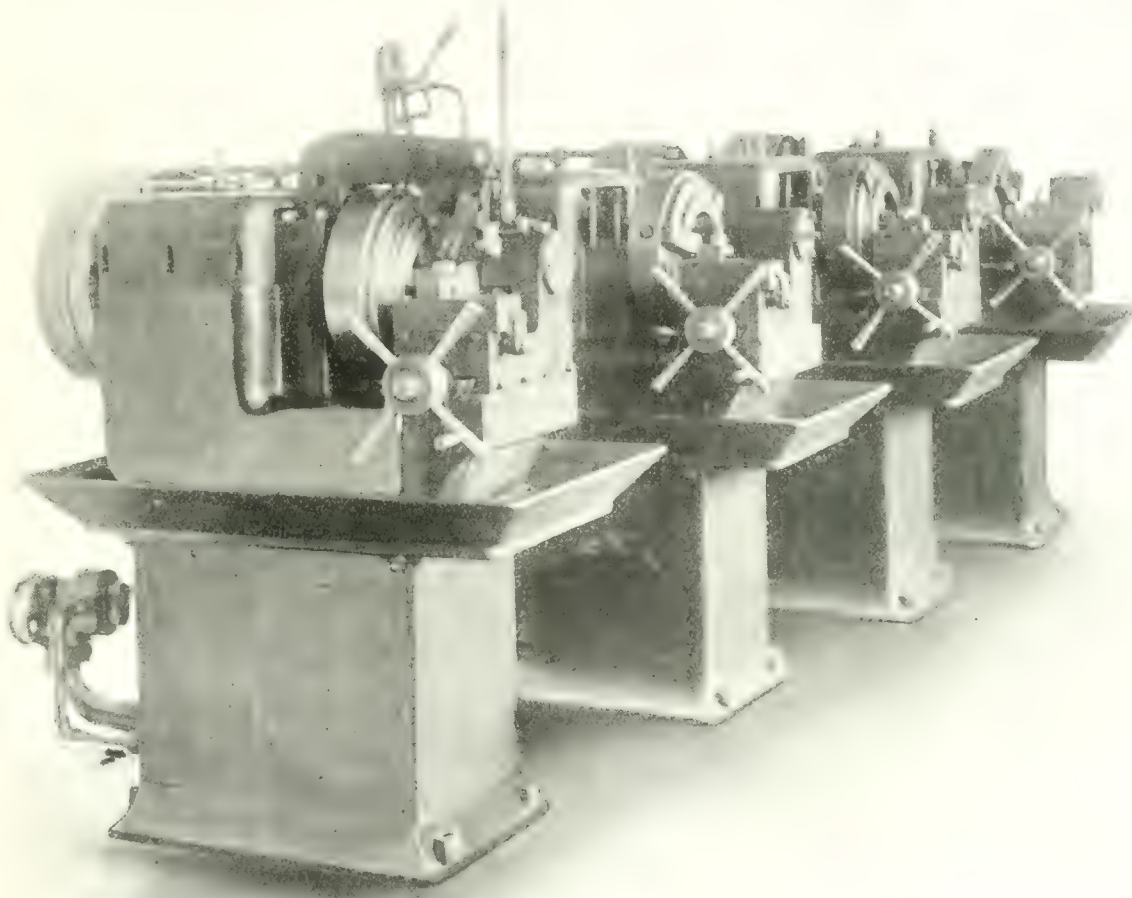
175-179 North Jefferson Street, CHICAGO

FOREIGN AGENTS: C. W. Burton Griffiths & Co., Ludgate Square, Ludgate Hill, London, England. Bureaux & Caisse, 39 Rue de Lappe, Paris, France.

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# Shell Manufacturers' SINGLE PURPOSE LATHES



This cut illustrates a group of machines furnished one manufacturer for Bush & Co. Ltd. Wave Thread and Undercutting in one operation.

These machines are designed for Trimming, Facing base, Finish turning body nose, Band Turning, Rough Turning body, Band Grooving, Wave Thread and Undercutting, etc., etc.

The object of the design included the following points which we believe have been successfully achieved:

- First**—The use of unskilled labor.
- Second**—Reduction of tooling expense by simplifying equipment.
- Third**—Economy of floor and ceiling space.
- Fourth**—Minimum installation cost, no counters, all to erect and belt.
- Fifth**—The relief of expensive turret lathes from operations for which they were not particularly adapted and at the same time simplify their work, allowing the use of unskilled labor.

Machines can be equipped for any outside operation on shells.

*Write for prices and details specifying operation for which machine is required.*

## The General Supply Company of Canada, Limited

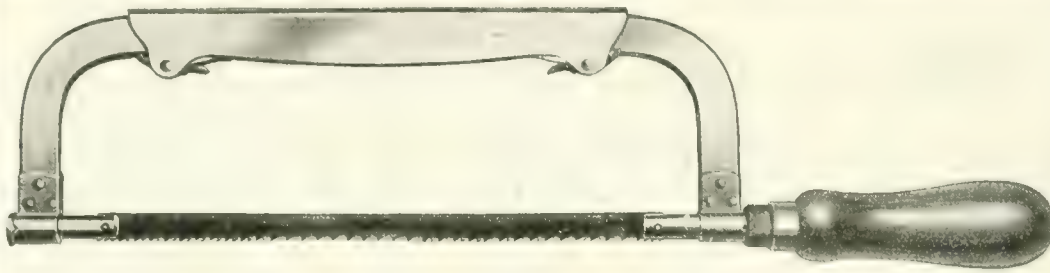
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OTTAWA, ONT.

125 Adelaide St. W.,  
TORONTO, ONT.

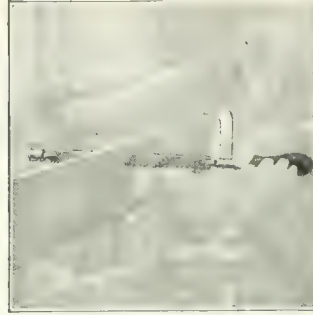
408 McGill Building  
MONTREAL, QUE.

85 Water St.,  
WINNIPEG, MAN.

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## Hack Saws for Clean-Cut Work



**Y**OU cannot expect a hack saw that is intended for work on cast-iron pipe to make a clean cut in sheet steel. For this reason the good workman who wants blades that are right for every job buys

## Starrett Hack Saws

There is a Starrett blade of just the proper steel composition, number and set of teeth, shape, size and thickness for every kind and shape of metal. Starrett Hack Saws properly selected will do better work and last longer than any general-purpose hack saw. For most satisfactory results with hand frames order by this table:

No. 103 Saws in hand frames, to cut cast steel, cast iron, tool steel and all solid metals.

No. 103B Saws in hand frames, to cut cold-rolled stock and soft metals.

No. 102 Saws in hand frames, to cut sheet metal and tubing 16 to 18 gage.

No. 253 Saws in hand frames, to cut sheets and tubing thinner than 18 gage.

No. 112 Saws for heavy hand frame work and light power machines, on tool steels.

No. 115 Saws for cutting electrical conduit pipe, brass stock, light angle iron and channel iron.

No. 262 Saws for cutting angle iron, brass stock and general line of ornamental iron work.

No. 259 Saws for cutting iron pipe, light structural iron, channels, eyebeams, auto frames, etc.

If flexible back saws are preferred, use Nos. 250, 252 and 258 instead of Nos. 103, 102 and 253 respectively. Many other styles for machine cutting. We sell direct to dealers. Write for free catalog No. 20-3 prices and discounts



**THE L. S. STARRETT COMPANY, Athol, Mass.**

*"The World's Greatest Tool Makers"*

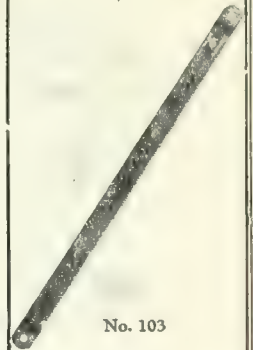
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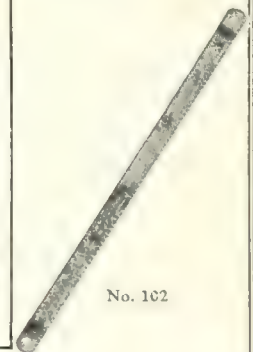
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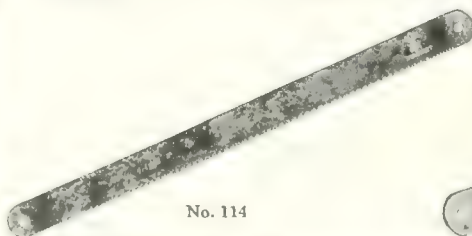
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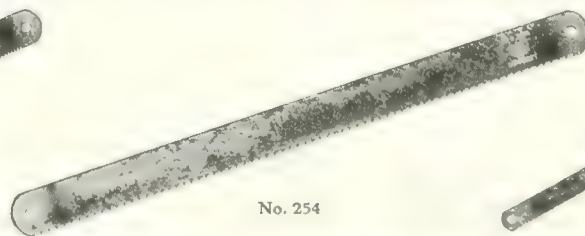
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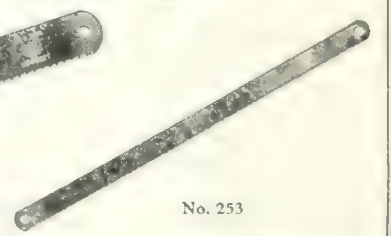
No. 102



No. 114



No. 254

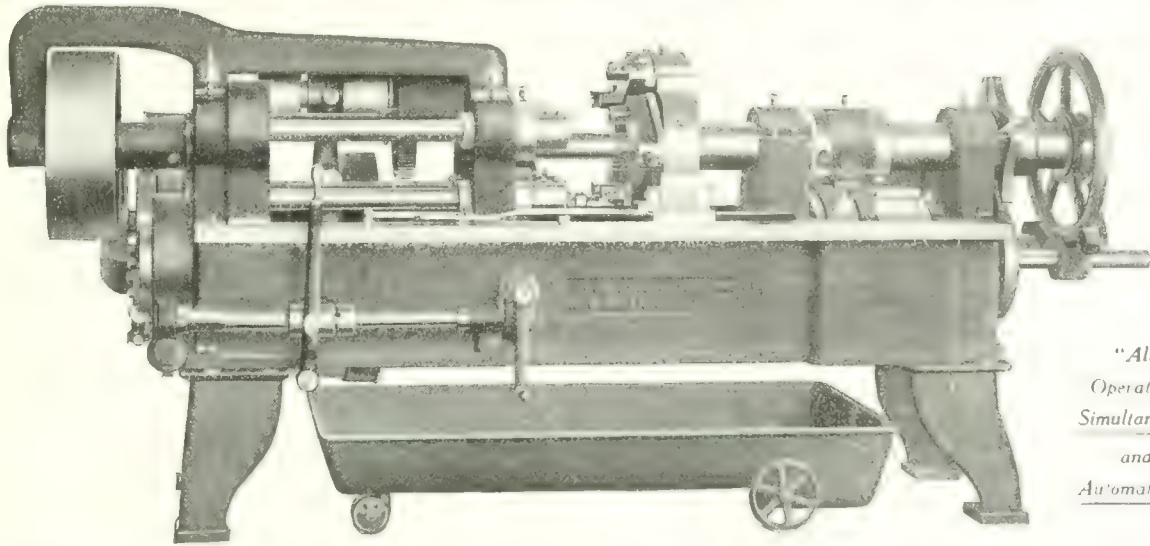


No. 253

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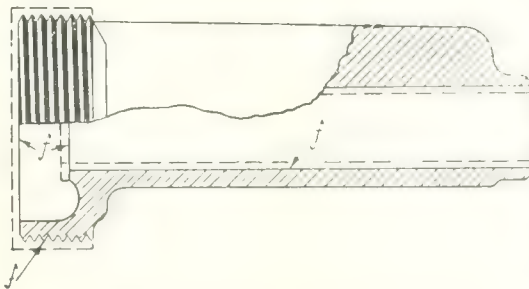
# Automatic Production of Hand Grenades



*"All  
Operations  
Simultaneous  
and  
Automatic!"*

**210 Fuse Tubes Per Hour!**

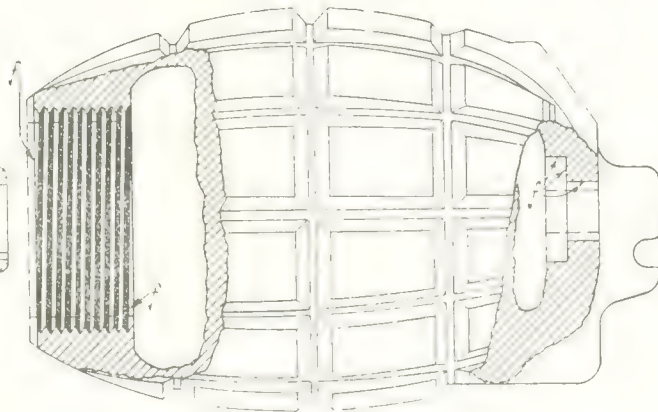
**200 Grenade Bodies per Hour!**



Labor Cost—14c per 100  
Material—Aluminum Casting

Operations:

Chamfered Faced Turned Bored  
Reamed and Threaded.



Labor Cost—15c per 100  
Material—Cast Iron

Operations:

Faced Chamfered Bored Seated and  
Tapped.

## Chucking Machine vs. Turret Lathe

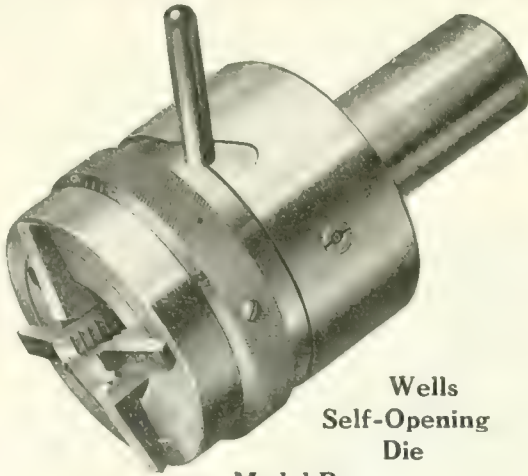
Production Time of Turret Lathe—Sum of individual operations, plus chucking time.  
Production Time of Chucking Machine—Longest single operation plus no chucking time.

*Both Single and Double-Head Machines—Send for complete catalog*

# The New Britain Machine Company

—Automatic Screw and Chucking Machines—  
NEW BRITAIN, CONN., U.S.A.

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Wells  
Self-Opening  
Die  
Model B.

We want to send you the booklet describing the different models. Are you willing to try the W.S.O.D. in your shop under your own conditions?

# W. S. O. D.

We call it the "universal die" because there is not a screw-cutting machine manufactured on which it will not fit.

Its very appearance attracts and holds you—you instinctively know it will do the work—and it will.

It is the simplest and most efficient of all automatic opening die heads.

**WELLS BROTHERS COMPANY OF CANADA, Limited**  
GALT - ONTARIO

Sales Agents:  
The Canadian Fairbanks-Morse Company, Limited, Montreal, Toronto, Vancouver, Winnipeg, St. John, Calgary.

## NORTON GRINDING WHEELS

**Alundum**  
TRADE MARK REGISTERED

for steel and steel alloys.

Made in the electric furnace, ALUNDUM is an artificial abrasive which is peculiarly adapted to grind materials of high tensile strength in a satisfactory manner.



**Crystolon**  
TRADE MARK REGISTERED

for cast iron, brass, bronze, etc.

This substance is also a product of the electric furnace and finds a wide range of utility in the manufacturing field where materials of less brittleness than steel are to be ground.

Norton ALUNDUM and CRYSTOLON Grinding Wheels will help solve your grinding problems.

*Our service is at your command.*

**NORTON COMPANY**

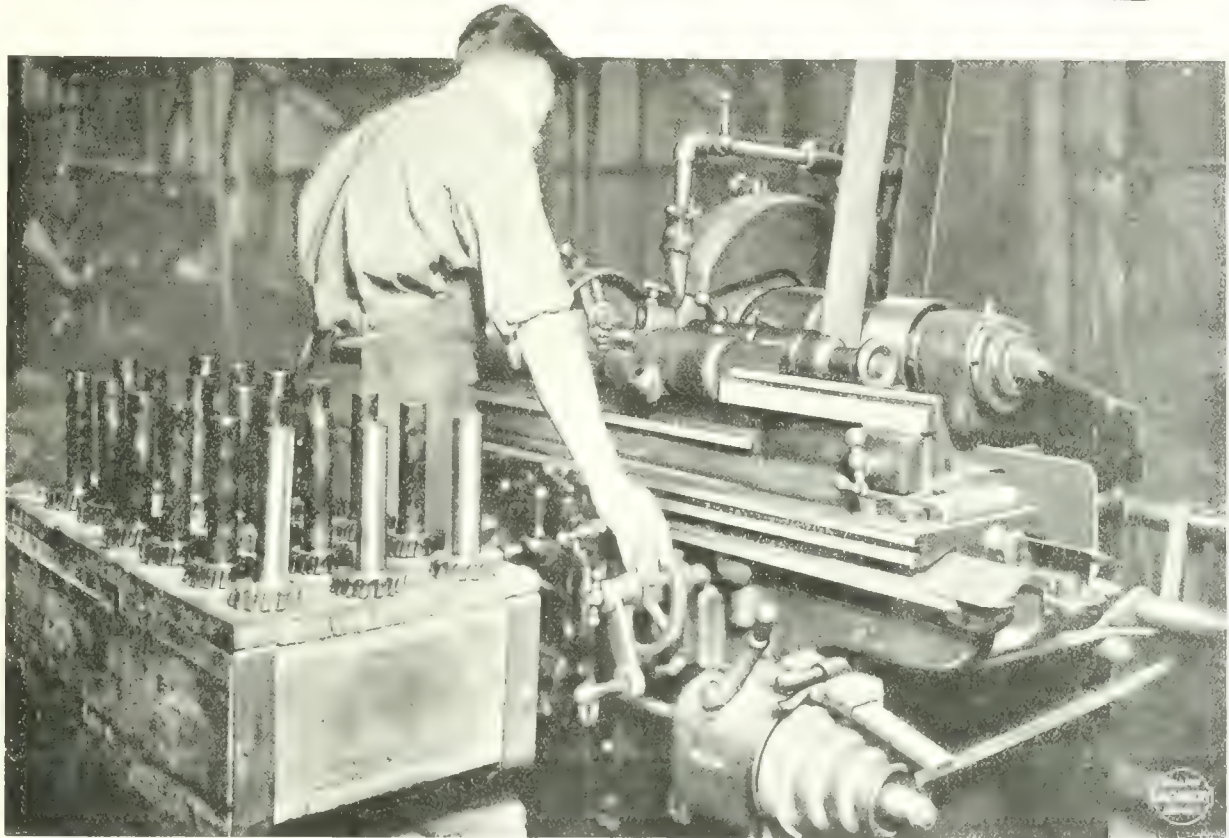
Worcester, Mass., U.S.A.

Canadian Agents: THE CANADIAN FAIRBANKS-MORSE CO., LIMITED, Montreal, Quebec, Toronto, Ottawa, St. John, N.B., Winnipeg, Calgary, Saskatoon, Vancouver, Victoria. F. H. ANDREWS & SON, Quebec, P.Q.

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# Norton Grinding



## 400 Shafts and Shoulders in 10 Hours

The Gemmer Manufacturing Company (Detroit) has a Norton Grinding Machine which is "earning its keep." The following figures are good and conclusive evidence of this fact—they are also instructive, provided you are producing work of similar nature.

The shaft is 51½" long by 11½" diameter and carries a shoulder 2" diameter by ¾" wide which must be at right angles to the shaft. The limit is close, the piece being part of an automobile steering worm mechanism and production is 400 shafts in 10 hours.

All Norton Grinding Machines handle easily—and upon ease of control largely depends speed of output. Norton Grinding Machines are accurate—both in the construction of the machines and the quality of work which is produced. There are many Norton advantages we'd be pleased to demonstrate.

**"The Norton Limit is the Grinding Limit"**

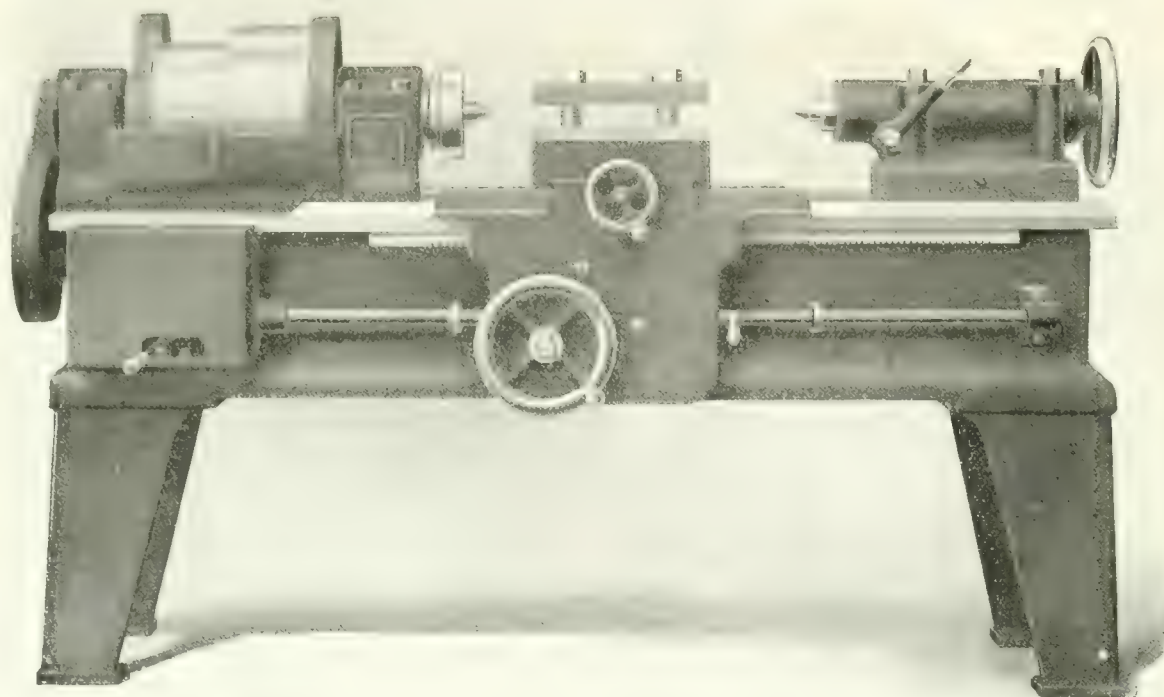
## Norton Grinding Company, Worcester, Mass., U.S.A.

CANADIAN AGENTS:

**THE CANADIAN FAIRBANKS-MORSE CO., LIMITED**

St. John, N.B. Montreal Ottawa Toronto Winnipeg Saskatoon Edmonton Calgary Vancouver Victoria

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## Do You Want a Lathe for Your Rush Work?

Here is a lathe for turning and boring projectiles ranging from 3 to 6 inches in diameter. It can also be used for general manufacturing work. It is a 24" lathe cut down to swing 16", adding to the rigidity and convenience of operation. Can be operated by unskilled labor.

### Specifications

Dia. of spindle	5
Swing over bed	16"
Swing over carriage	10"
Distance between centers	21"
Ratio of back gearing	6.25 to 1
Diameter of tailstock spindle	3 1/2
Travel of tailstock spindle	8"

**Large diameter two-step cone for 6" double belt. Steel gears.**

Let us give you full details on this lathe. It will prove a money-maker for you on your work. Good deliveries still available.

## The Canadian Fairbanks-Morse Co., Limited

St. John, Quebec, Montreal, Ottawa, Toronto, Hamilton, Winnipeg,  
Saskatoon, Calgary, Edmonton, Vancouver, Victoria

Canada's Departmental House for Mechanical Goods

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# Successful Production of 4.5 in. Shells in a Stove Foundry

Staff Article

*Shell making in Canada has passed well beyond the novelty stage and may easily be designated as having assumed a place of prominence comparable with the most outstanding and successful of our hitherto established metal-working industries. In many instances, output of finished shells is being developed to such an extent to meet the requirements of our Munitions Committee, that the regular lines of the firms engaged have almost ceased to exist.*

THE plant from which this article was obtained is still engaged in stove-making, but their greatest meantime activity, like many other concerns, is in the manufacture of 4.5 in. high explosive shells.

Having little or no machinery with which to commence shell operations, it was some time before much progress was apparent; but after several months of preparation, a large store house, adjacent to the foundry, was equipped with machine tools suitable for the purpose, and in a short time an output of 400 finished shells per day is expected.

The present plan of the machine tool layout is shown in Fig. 1. The larger section of the building is one storey high, the portion to the left being of two-storey construction. It is intended to move the tool room to the floor above and use this space for additional manufacturing equipment.

In the plan layout the numbers indicate the various operations on the shells as they proceed through the shop:—(1) Cut off and face base; (2) Centre base; (3) Rough turn; (4) Boring; (5) Face base; (6) Nosing; (7) Bore and thread nose; (8) Rough outside diameter and contour; (9) Finish outside diameter and contour; (10) Grind; (11) Weigh and test; (12)

Doctoring; (13) Rough groove; (14) Wave and undercut; (15) Rough and base; (16) Finish base and recess; (17)

The shell forgings are brought in at the door A, and after going through the sequence of operations are finally taken

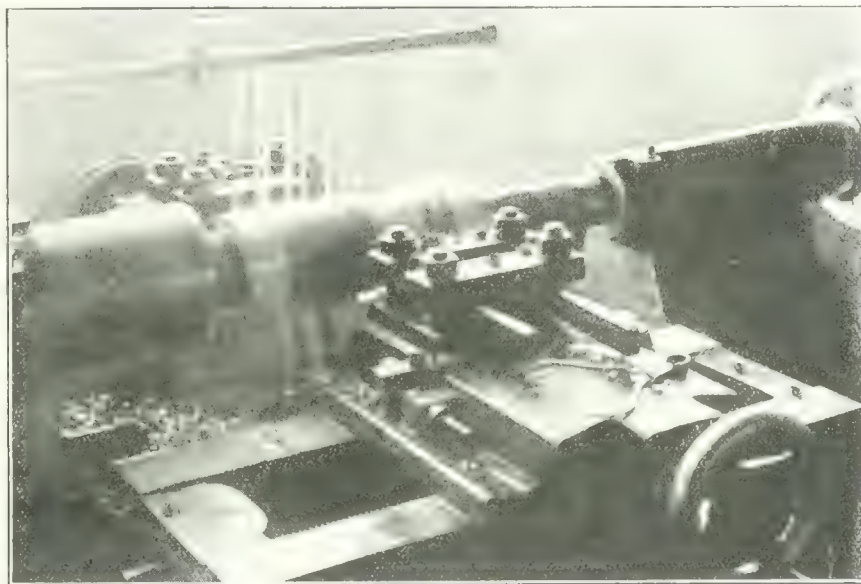


FIG. 2. ROUGH TURNING SHELL BODY

Rivet hole plate; (17A) Saw off square; (18) Face and finish base; (18A) Brass sockets; (19) Press on copper band; (20)

through the door B, where they are crated in readiness for shipment. The numbers refer to the various operations.

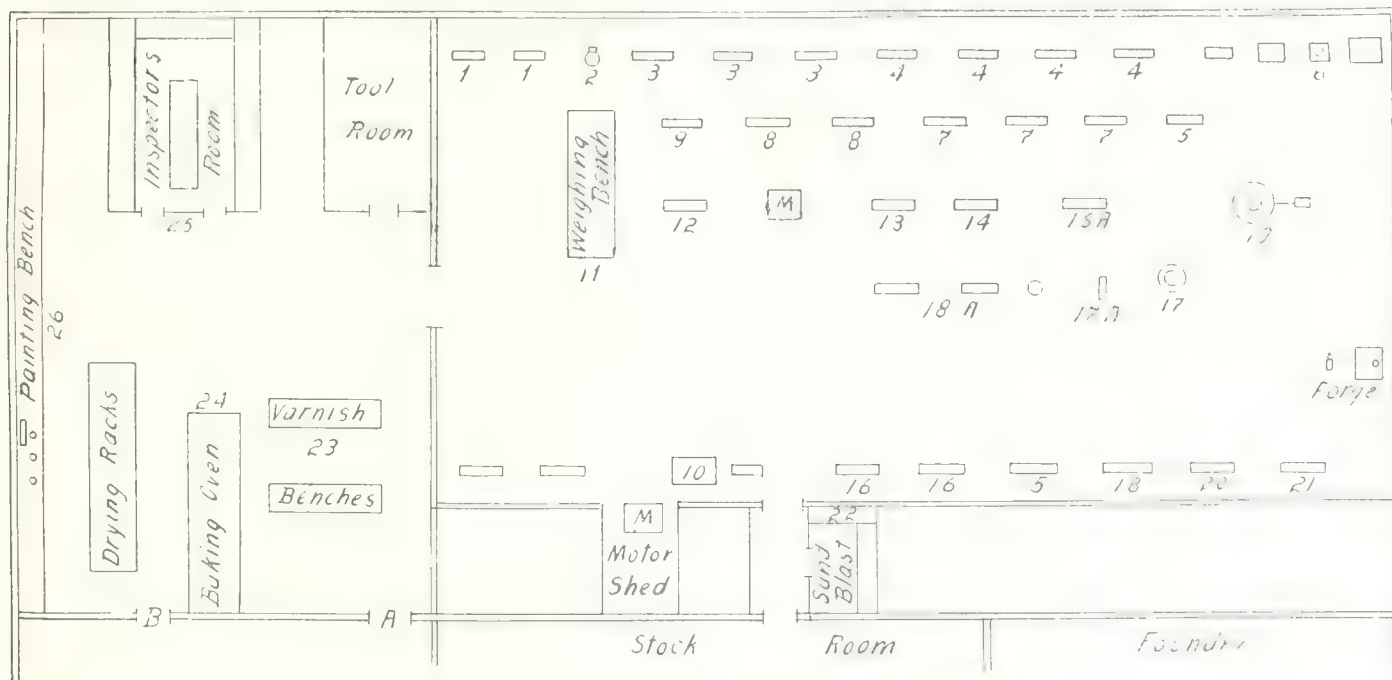


FIG. 1. SHOP PLAN, ALSO NUMBERED SEQUENCE OF OPERATIONS

(8) Rough outside diameter and contour; (9) Finish outside diameter and contour; (10) Grind; (11) Weigh and test; (12)

Turn copper band; (21) Marking base; (22) Sand blast; (23) Varnishing; (24) Baking; (25) Inspection; (26) Painted.

upon the shells, as they pass through the shop, during the various stages of completion.

### Cutting Off and Centring

The first operation, that of cutting off the open end and rounding off the base is performed on two "Hall" cutting off machines; an average production of 125 a day of ten hours being obtained on each. After this operation the shells are placed upon a jig secured to a drill table

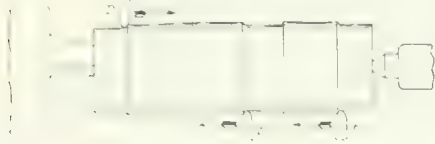


FIG. 3. TOOLING DIAGRAM, ROUGH TURNING SHELL BODY.

and the base centered with the rough bore of the forging.

### Rough Turning

Rough turning the outside diameter is the third operation. This is accomplished on one Cincinnati Pulley Machine Co. lathe, with an output of 9 to 10 shells per hour, and on two J. B. Reed, 24-inch engine lathes, with an average production each of 78 per ten hours. On these last two lathes the cone pulleys have been altered to accommodate a 5-inch belt to secure increased power. (Fig. 4.)

A view of the "Cincinnati" lathe in operation is shown in Fig. 2. Three cutting tools are at work on the shell body, two at the front and one at the rear of the lathe. The front tools are fed into position, the forward tool commencing the cut about one-third of the shell length in advance of the other which starts operating on the base end of the diameter. The single tool at the rear is started at the open end of shell and travels toward the base. The setting of the tools is adjustable by the stop shown to the left of the front cross slide. By this method the rough turning is completed when the tools have travelled a fraction over one-third of the shell length.

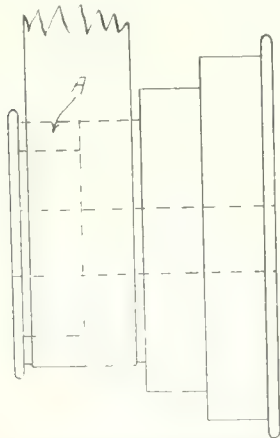


FIG. 4. CONE PULLEY EXTENSION FOR ROUGH TURNING BODY.

The position and action of the tools can be clearly seen in Fig. 3. While the tools are in position, the tools are adjusted by the stop shown to the left of the front cross slide.

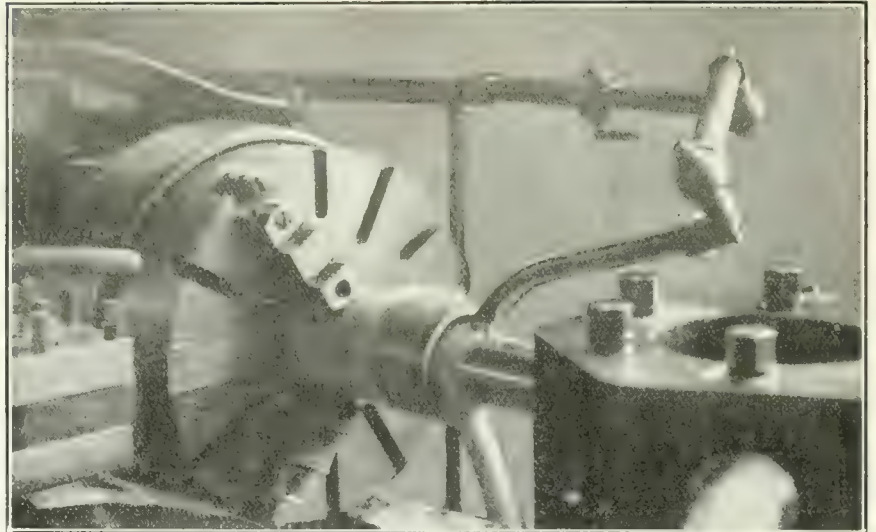


FIG. 5. BORING OPERATION ON "LIBBY" LATHE.



FIG. 6. SHELL NOSING EQUIPMENT.

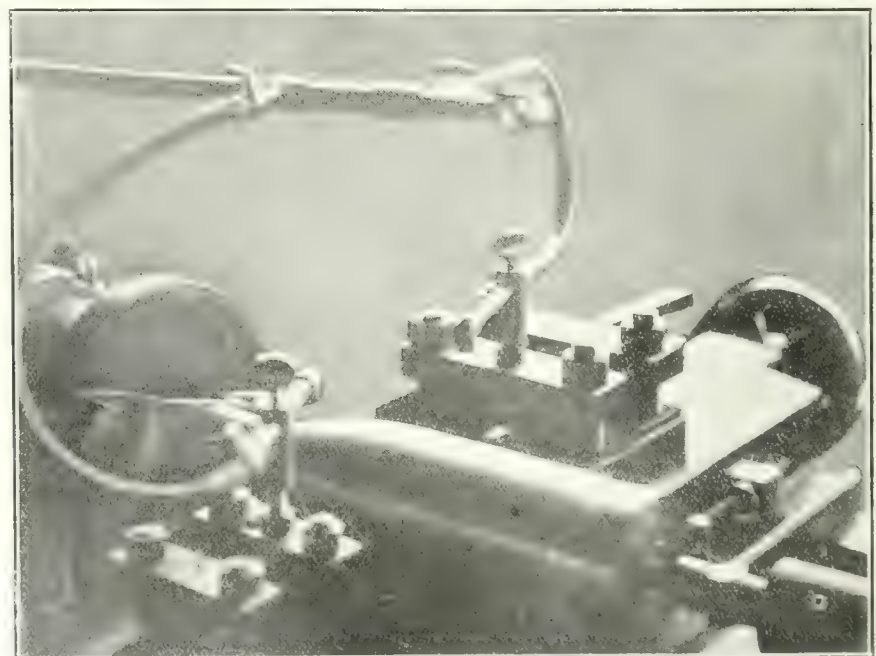


FIG. 7. ROUGH TURNING NOSE PROFILE AND BODY.



ing toward the headstock, the rear tool, D is traveling in an opposite direction.

#### Boring

The fourth operation, boring the internal diameter and forming contour of base is done on three "Libby" turret lathes, also on one heavy duty "Le Blond" 26-inch engine lathe, fitted with special turret constructed in the shop. On the "Libby" lathes, shown operating in Fig. 5, the chuck was bored out a little larger than the diameter of the rough turned body, so as to allow the shell to be gripped in the centre, thus securing greater rigidity and increased output. The latter averages 65 in ten hours. The chamfers from the two outside diameters is put on by a tool in the cross slide while the bore is being finished. All cutters and cutting tools are made of "Firth's Speedicut" steel.

#### Refacing Base

After the shells have been bored, the base is faced off perfectly square, as any deviation from the vertical position might cause trouble when the mouth of the shell was being closed in. When facing off the base at this stage,  $\frac{1}{8}$  of an inch is allowed over the finished dimension to obtain a narrow flange for riveting over the base plug.

press the stock at the lower portion of the contour, and the shell when nosed may be too short. On the other hand, if the nose has not been heated sufficiently increased strain is put upon the nosing die, which may result in its breaking.

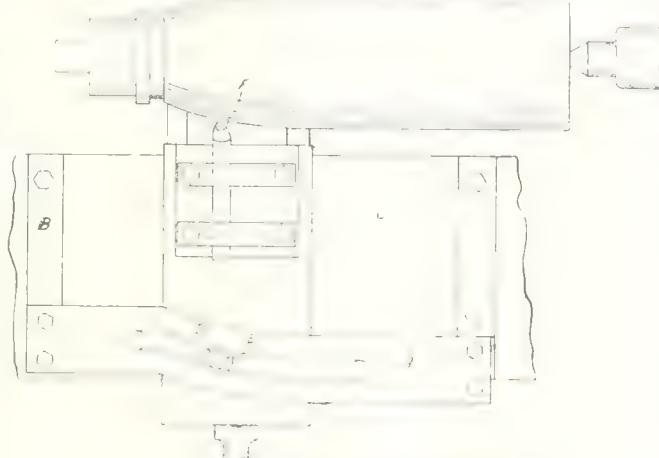


FIG. 5. PROFILE TURNING DEVICE

The shells when heated, are placed in a "Perrin" press, equipped with a water cooled cast iron chilled die, and the nose formed. The hydraulic press derives its power from the accumulator shown, which is controlled by a three-cylinder belt driven pump installed by the W. R. Perrin Co., of Toronto.

#### Annealing

Following the nosing operation, the

#### Roughing Outside Contour

Rough turning the outside diameter and contour of nose is the eighth operation. This is being accomplished on the Cincinnati Pulley Co. lathe shown in Fig. 7. While the tool at the rear is working on the parallel portion of the shell, the front tool is operating on the profile of the nose. The travel of the tool is governed by the run of a roller in a cam, shown in Fig. 8. The advantage of the two tools working in unison is the accomplishing of the desired result in about half the time ordinarily taken.

In Fig. 8 the brackets B which carry the cam plate A are secured to the ways of the lateral slide C. The stud E carrying the roller D is screwed into the cross slide which supports the cutting tool F. In setting the tool, care must be taken in order to have the cutting edge in line with the centre of the roller, in other words, the cutting tool should be in the same location on the shell profile, as the roller in the cam slot. It should be borne in mind that the shape of the profile produced is governed by the path of travel of the centre of the cam roller. An output of 20 shells per hour is obtained from this operation.

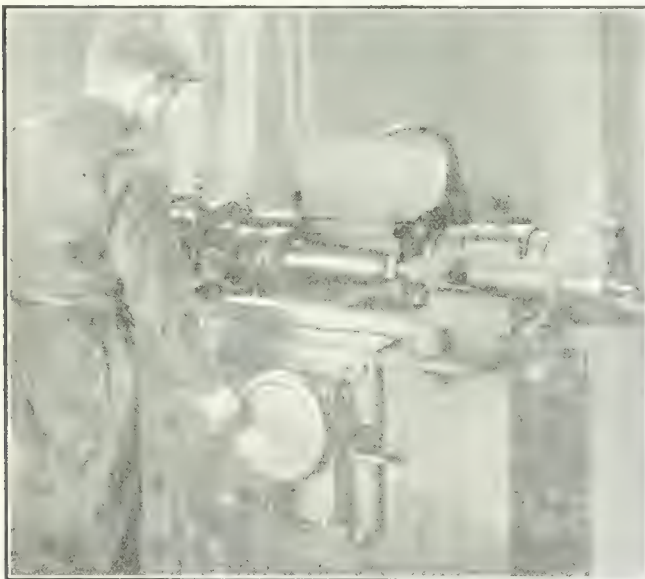


FIG. 9. SHELL BODY GRINDING

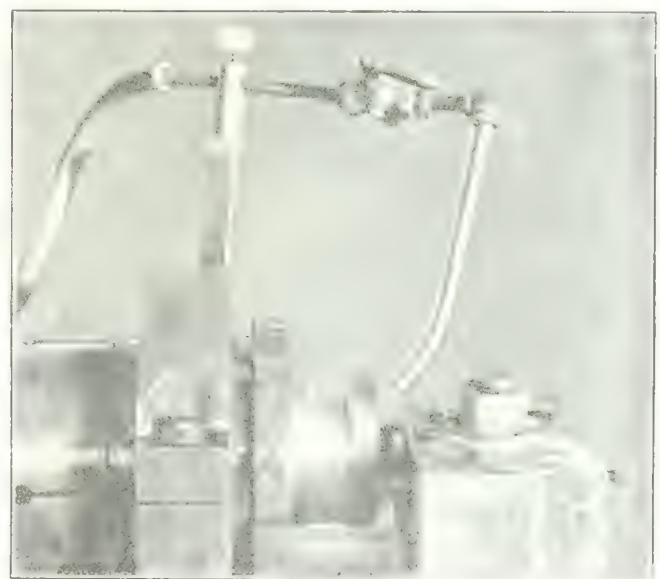


FIG. 10. ROUGHING OUT BASE RECESS

#### Heating and Nosing

The sixth operation, shown in Fig. 6 consists in nosing the shell. The Mechanical Engineering Co. furnace shown at the extreme right, heats the shells to the desired temperature, but to obtain good results much depends upon the experience and judgment of the heater. If the shells are heated too far down, the action of the closing-in process will com-

shells are placed in boxes of lime to anneal in readiness for further machining.

#### Threading the Nose

The boring, shaping and threading of the nose is the seventh operation. Two 20-inch "Walcott" engine lathes, fitted with special turrets designed and made in the shop, are used on this operation. The daily output, 24 hours, from these machines is over 400 shells.

#### Finish Turn and Contour

The shells now receive a finishing cut over the entire surface to bring them to the correct dimensions. This is performed on an 18-inch "Walcott" engine lathe fitted with a cam device, attached to the rear of the lathe.

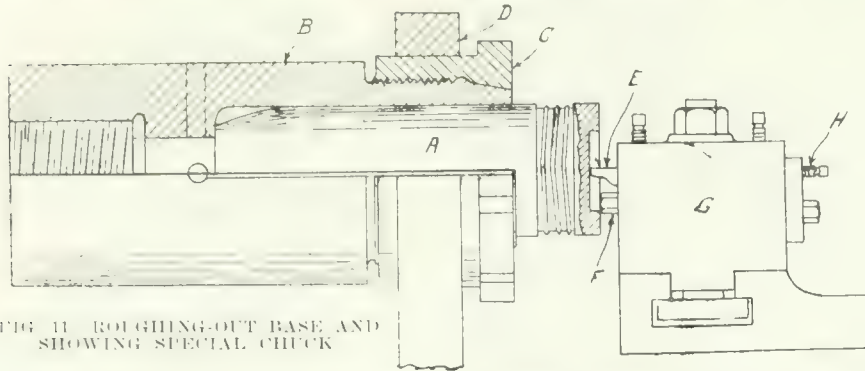
#### Grinding

In some instances, where the shells have been found too large after the fin-

the turning process, due to wear of tools or excessive hardness of material, it has been found necessary to grind the external surface. This is done on the "Ford Smith" grinder equipped with

separately, are done on one lathe; an extra head and attachment being placed on the bed of a 25 in. "Bertram" engine lathe equipped with a "Bertram" waving and undercutting attachment.

screw H adjusts the depth of cut and also helps to take the lateral thrust. An output of 150 to 180 shells is obtained in ten hours.



"Canadian Hart" wheels, and as shown in Fig. 9.

### Weighing and Doctoring

The eleventh operation is the weighing and testing. Shells at this stage found to be overweight have the surplus stock removed from the base. This is done in what is called the doctoring lathe (12) which also takes care of other corrections that may be required at different periods during the progress through the shop.

### Wave and Groove

The next operation is the roughing out of the copper band groove. Contrary to the general practice, this plant is roughing out the groove in one operation and waving and undercutting in another. These operations, although performed

Thirty-two shells per hour constitute the output from this machine.

### Roughing Out Base

The base is now roughed out on a "J. B. Reed" 20-in. engine lathe fitted with special drive. This is the fifteenth op-

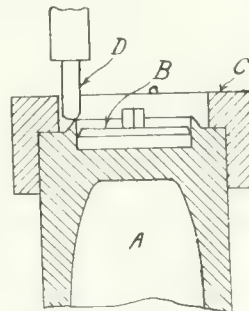


FIG. 13. SKETCH SHOWING BASE PLATE RIVETING ARRANGEMENT

eration and is shown in Fig. 10. A sketch of the special chuck and tool arrangement is seen in Fig. 11. The shell A is held in the chuck B by closing the nose with the nut C. The rear portion of this nut is turned to fit the bore of the steady rest D. This design allows the chuck to

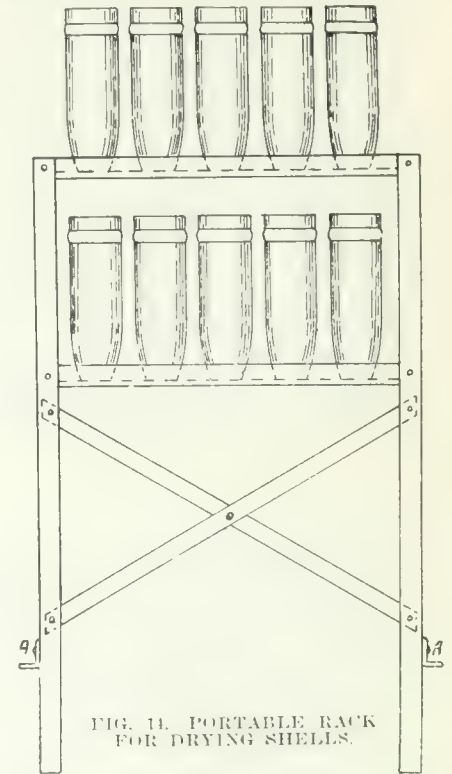


FIG. 14. PORTABLE RACK FOR DRYING SHELLS.

### Finishing Base Recess

After the bases have been roughed out, the shells are taken to two "Walcott" 18-inch engine lathes, and the recess and base finished to receive the base plates, which are previously machined in a "Bardons & Oliver" turret machine.

### Riveting in Base Plate

The base plates are placed in the recess and the shell held in a chuck secured to a standard on the floor, as shown in Fig. 12. A gauge C, Fig. 13, is placed



FIG. 12. RIVETING IN BASE PLATES

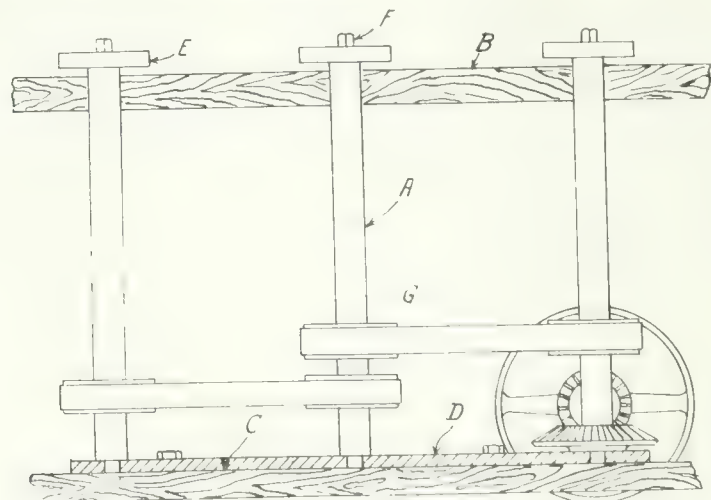


FIG. 15. SHELL PAINTING DEVICE

be supported close to the point at which the pressure is being applied. The tool E is forced into the metal until the stop F reaches the base of the shell, while the

over the bottom of the shell to guide the position of the hammer D, when riveting in the base plate B. When the riveting has been partly finished, the shell is re-



moved and the square on the plate cut off in a "Racine" power hack saw.

The base plate is next faced off flat, and the riveting completed. The base of shell is then finished and the corner rounded.

#### Brass Sockets

The brass sockets are now screwed in and turned, and the small hole drilled and tapped to receive screw for time fuse. At present the sockets are being screwed in by hand with a pipe wrench, but it is contemplated to adopt some method whereby the work will be performed by the use of a power machine.

#### Copper Banding

The nineteenth operation, that of pressing on the copper band is done on a "Lymburner" hydraulic banding press. This is operated by a pump of the same make.

Turning the copper band is the next operation. This is done on a "Lodge & Shipley" 22-inch engine lathe, equipped with a "Lymburner" band turning attachment. The production on this machine is about 25 per hour.

A "Brown Bogg's" marking machine is used to officially stamp the base of the shells.

#### Sand Blast and Varnishing

The shells are next taken to the sand blast room and thoroughly cleansed of all cuttings, oil and other foreign substance. This is necessary so that the varnish will have a uniform thickness over the entire interior surface.

Following a preliminary inspection, the heated varnish is poured in and out again, after which the shells are put on a portable stand, Fig. 14, and placed in a baking oven for several hours. This stand has two shelves each containing 25 shells and near the bottom of the legs are two pieces of angle iron (A) in such a position that the "Chapman" elevating truck can be used in transferring them about the shop.

#### Painting

After the baking process the shells are taken to the Government room for final inspection, and from there to the painting department. The arrangement used for the latter is shown in Fig. 15. The three shafts (A) extend through the bench (B) to a bar (D) secured to a lower member of the bench (C). These shafts revolve by means of the mechanism shown. The shells are placed in the cup plates E and are revolved by the square F which fits into the hole in the socket plug. They are finally put up in boxes, two shells to each box, ready for shipping.

### THE AUTOMATIC MACHINE

THE automatic machine often offers a reduction in labor cost that more than offsets the increase in overhead charges which it incurs. Conditions of the labor market are sometimes such that the automatic is used even where the total cost of its product is known to be somewhat higher. It is undoubtedly true that there are many cases of hand turret lathes being used when automatics would be more economical, and there are certainly a great many cases when the reverse is also true. The merits of any particular case must be decided by the exercise of unusually good judgment; or, better, by a study of costs which takes the overhead charges into account as well as the labor cost.

In this connection it may be noted that the manufacturing cost of high-grade machinery is usually made up of about one-third direct labor, one-third material, and the other third overhead charges of various kinds. Of these three items, that of material is not greatly affected by the style of machine used. In large work the hand machine tends to reduce the overhead charge, while the automatic machine tends to reduce the direct labor charge.

#### Automatics and Quantity Production

If there is demand enough for an article to support large establishments for its manufacture, and if there are no patent or other restrictions to keep its manufacture in the hands of men of limited ability, the normal tendency is toward quantity manufacture. The cheapening of production by using automatic machinery on large lots is an important factor in this tendency.

If the article of manufacture can be standardized, so that the design changes little from year to year, the advantages of large scale manufacture are still more apparent. Machines can be kept on one piece continuously day and night, if necessary, until worn out. Operators can be trained to great skill, not only in getting large output for the comparatively few pieces or operations in their repertoire, but in getting a high grade of workmanship as well, where that is necessary. Special machines, each built for one operation only on a single piece of work, can be profitably used.

Such a manufacturing system also has its disadvantages. The most obvious of these are the necessity for keeping the product free from change as far as possible; and, also, the monotonous character of the work from the operator's standpoint. Of course, no industry is fit for large scale, intensive manufacture until the product is fairly well standardized; or at least until the particular design selected for manufacture is such that it will suit a large percentage of possible customers. To increase the field

of customers, such an establishment is in a position to offer attractive low prices for its standardized output, in place of the frequent novelties and special features offered by smaller manufacturers.

There is also something to be said for such an establishment from the standpoint of the workman. An immense amount of ability, of the highest order, must go into its management; and its organization furnishes opportunities for many such men. On the other hand, for workmen of faithfulness and dexterity, but small originality, it can and ought to furnish work at higher wages than they could obtain in any other employment. Many skilled workmen, as well, find these high wages a compensation for the monotony of continuous work on one piece.

From a paper presented at the International Engineering Congress, San Francisco, by Ralph E. Flanders, manager, the Jones & Lamson Machine Co., Springfield, Vt.



### LUBRICATING CHAINS

SOMETIMES lubricating chains are employed instead of rings for bearings, the idea being that the chains touch the shaft through a longer arc, and, therefore, are supposed to be kept in motion more surely than plain rings. It must be remembered, however, that the part of the chain immersed in the oil bath offers greater resistance than a plain ring, so that in actual practice there is not much difference between the working of chains and the working of rings. At high speeds there is the disadvantage with chains that the links, when passing through the oil, churn it up. This makes it more difficult to prevent leakage of oil from the bearings.

Satisfactory lubrication of dynamo bearings, i.e., cool running and inappreciable wear, is very important. If wear takes place this means that the rotor is lowered, and the magnets will then exert a pull in a downward direction, which further increases the pressure and accordingly the wear of the bearings.



EVERY applicant for a position undergoes an appraisal based on outward appearances. This initial valuation may or may not be correct; but it counts for a great deal with most employers, for the average employer flatters himself that he is an excellent judge of human nature at sight. First he looks at the features, then at the garments of the man, or he takes in both at a sweep. Instantly he classifies the applicant, and, since he has made this tentative classification, is slow to change it—Engineering and Contracting.

# Large Shells : Production Problems and Possibilities--III.

By C. T. D.

*In preparing to undertake the production of large shells up to 9.2 in. dia., manufacturers will encounter problems of a nature altogether different from those connected with 18 pdr. shells. Automatic machinery will not be so applicable to the larger sizes, and productive ability will centre largely on such points as sequence of operations, tooling methods, etc.*

THE operations listed in group B are those which would be actually required if group A has been performed in the order shown. If the nose has been centred only and not drilled through, it may now be drilled very close to the finished size, leaving only sufficient for a light cut with the boring bar in operation B 3.

One point in favor of centering the nose only and not drilling through in group A, is that it allows the shell to be positioned by the point of the arbor which acts directly against the inside surface of the nose, whereas if the hole be drilled first, the end of the arbor has to be formed of three points making contact on a circle larger than the hole. This point of contact is situated on the tapering part of the nose, and any slight variations in the profile, or irregularities in the surface would cause a greater change in the position of the shell due to the sloping wall on which the arbor made contact.

Such change in position might vary considerably with roughly made forgings and cause occasional trouble with thin walls which can be avoided if the shell be positioned with the point of the arbor against the end of the nose. The possible variation in position would now be directly proportional to the irregularities on a small surface which could be inspected both by eye and hand much more effectively than the sloping portion of the nose; the actual point of contact being known, whereas the probable points of contact on the three-point arbor could only be guessed at.

any vertical drilling machine of suitable size. In performing this operation, the internal supporting arbor is dispensed with, and the shell placed upright on the

The boring bars are fitted to a simple form of revolving tool box or turret, which should be accurately located to line up the bars with the spindle, and

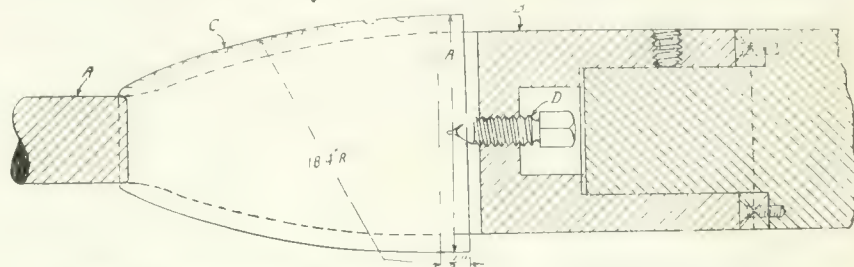


FIG. 6 DETACHABLE BORING HEAD WITH FORMED CUTTER.

base which has just been trimmed. If the drilling be done with ordinary care, the hole will be fairly concentric with the outside surface of the shell, and will run practically true when the shell is chucked as per operation B2, see Fig. 5.

The tooling outfit as shown here can be used for every operation which it is ad-

securely fastened in place. A quick acting and rigid clamping device is essential.

The boring bar shown in operation is made as large as possible, while leaving sufficient space for cuttings to pass freely. One slot only is shown, and a set of interchangeable double edge cutters is

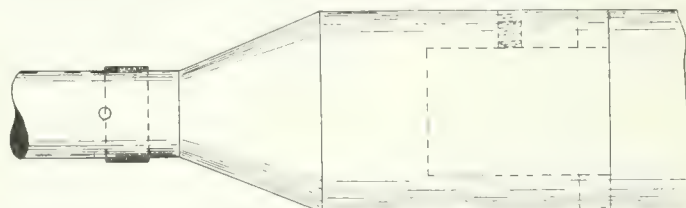


FIG. 7 NOSE REAMER

visible to do at this chucking of the shell. The forging shown is the one for the 8 in. shell, and as many makers will be utilizing existing machines, the belt power will probably not be sufficient for pulling simultaneously all the cuts which it is possible to arrange. The work,

used. These cutters are checked in on the back and held in place by a wedge.

After roughing and finishing the parallel bore, the turret is reversed and the forming cutter, sometimes termed arch, acorn, or nose reamer, is brought into action. Two cutters of this type are

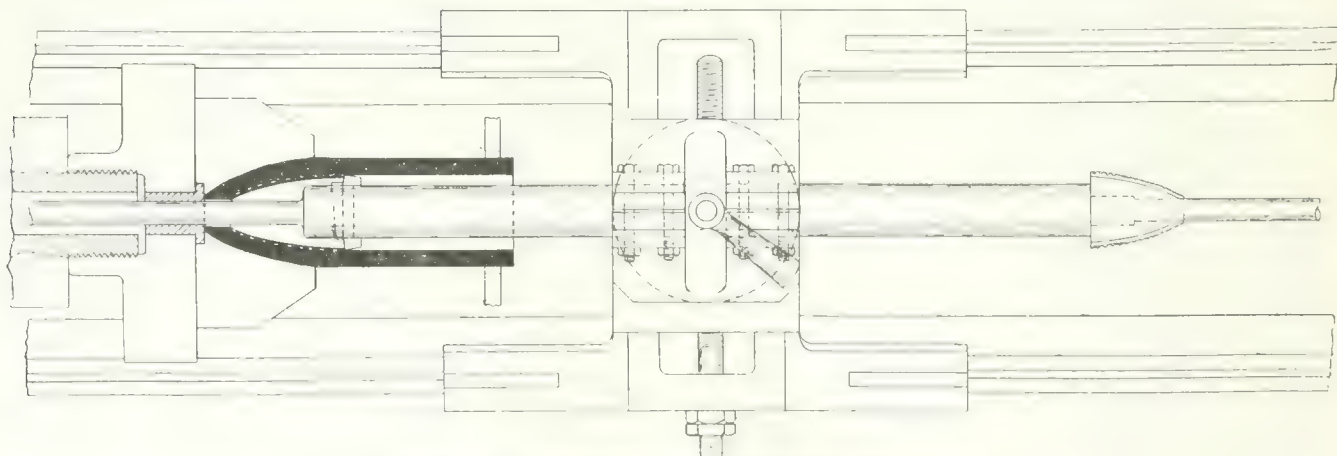


FIG. 5. DIAGRAM ILLUSTRATING OPERATIONS B3, B4, AND B5

Should it happen, therefore, that operation B1 calls for drilling as scheduled, this can be done quite satisfactorily in

therefore, is arranged more in accordance with such methods as obtain in general machine shop practice.

necessary, the roughing ones have serrated edges to facilitate breaking through the scale quickly, and the finisher being



ground exactly to the required curve.

Where tool room facilities are available, and the cutters can be properly hardened, the method of construction preferred may be that in which the cutter is made from solid stock, and grooved like a reamer, with any desired number of cutting edges. First-class workmanship is necessary for the production of this type of cutter, and it must be kept in good condition, and used carefully if costly renewals are to be avoided. It is not quite suited for use with a pilot which is somewhat against its use in ordinary machines. It is used, however, on some special machines having very rigid boring bars.

A type of flat blade cutter is shown in Fig. 6, which has the merit of simplicity of construction, and cheapness of renewal, and permits the use of a pilot if desired. The pilot A, and body B, are made in one piece, a slot being cut to receive cutter C, which is checked at the nose to position it at the pilot end of the slot. The base end is centered to receive the point of set screw D, which is made as large as possible. This set screw is located at the bottom of hole which fits on the reduced point of the bar in the turret. Two driving keys are fitted on the bar and drive the cutter through corresponding slots as shown. A hollow set screw is provided in the cutter body to ensure its withdrawal from the shell.

In making roughing blades for this type of cutter it is satisfactory to file the bottom clearance by hand, but the shape

finishing cutter. Reference to Fig. 6 shows a method of determining the serrations. Diameter A is made cylindrical

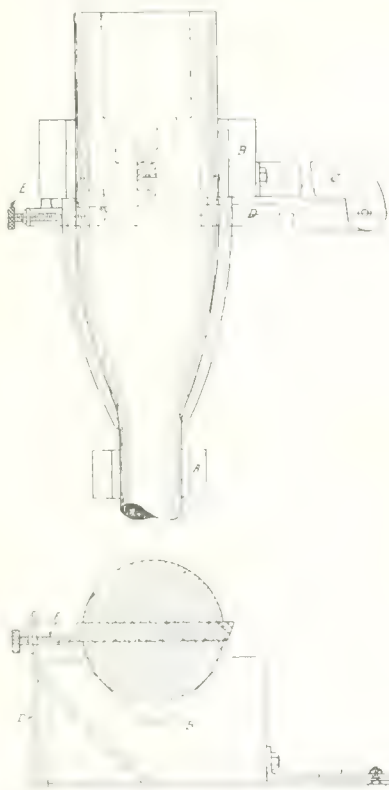


FIG. 6. RADIIUS GAUGE FOR INDICATING PROPER CLEARANCE ON FORMED CUTTER.

and three to five thousandths of an inch smaller than the finished parallel bore.

#### OPERATION TABLE

Operation Number	Description
<b>Group A.</b>	
1	Grind off scale on point, forming small flat
2	Place on expanding arbor which locates shell from inside, and position it lengthwise from inside of nose
3	File off base of shell to necessary thickness
4	Drill centre with drill in lat stock, remove drill, and adjust dead centre
5	Rough turn body, commencing at nose and traveling to point where open end of shell is cut on
6	Cut off open end of shell to length measured from nose.
<b>Group B.</b>	
1	Drill hole in nose, leaving stock for final boring
2	Chuck by nose with cutter end in steady. Nose of screw in contact with gauge stop on chuck.
3	Bore parallel portion with roughing and finishing cutters.
4	Form anterior of nose or arch
5	Finish overall length and counterbore. Tap base.
<b>Group C.</b>	
1	Tap nose.
2	Insert threaded driving plug centre in nose and secure threaded plug centre in nose.
3	Finish outside to size and shape.
4	Machine and undercut groove. Wave ribs.
<b>Group D.</b>	
1	Press up driving band.
2	Machine driving band.
<b>Group E.</b>	
1	Remove service plugs and assemble back plug and counterbore.
2	File off base and finish boring.
3	Reamed interior and bore.

of the serrations or gashes on the cutting edge should receive some consideration so that the height of the ridges left for removal by the finishing cutter is fairly uniform, and excessive wear is not localized on any particular part of the

sets to act as a pilot on the rear end of the cutter and prevent excessive side strain on the set screw.

The flatter portion of the curve immediately forward of diameter A, may be gashed with a small round file, while fur-

ther forward the gashes take the shape of saw teeth so proportioned that the short side of the tooth is at right angles to the direction of feed. Suitable clearance must be given to this edge and care must be taken to make the root of the tooth nearer the centre of the bar than the point is. By doing this, the teeth cut with the small edge only and with the greatest efficiency. The dotted lines in Fig. 6 indicate the form of the serrations on both edges of the roughing cutter.

The finishing cutter of course is made exactly to profile called for by drawing. Attention may well be given to the method of forming the bottom clearance on this cutter so that considerable thickness of the blade can be ground away in sharpening without altering the accuracy of the curve. If the blade be mounted in a bar, and given clearance in the ordinary manner with a relieving attachment in a lathe the clearance on the large diameter will be greater than at the point or nose. This is because the plane in which the relieving tool moves is always at right angles to the bar, consequently as the curve of the blade approaches the bar, it is no longer at right angles to the plane of the relieving tools. If the curve of the blade were such that it turned round square across the bar, so as to cut like an ordinary boring cutter, the relieving tool would not give it any clearance at all.

To form this clearance by machinery would call for more complicated mechanism than is desirable. It can easily be done by hand and checked up by a gauge as shown in Fig. 8. The machining arbor is supported on suitable vee blocks A and B. Attached to the larger block B, is an extension C, which supports the radius arm D. This radius arm is made equal in length to the radius called for on the finished shell, and the point on which it swings is coincident with the centre from which that radius is struck. The end of the arm is turned up towards the curved edge of the cutter and has two holes tapped level with the upper and lower edges of the cutter. An indicating screw E, adjusted in either of the holes will show any deviation from the true curve, and the desired amount of clearance can be given by hand and checked up accurately by using the indicating screw in the upper hole. A suitable centre should be provided in the hinge pin of the radius arm so as to set the indicating screw accurately.

As shown in Fig. 5 the nose of the shell is butted up against a gauge stop on the chuck so that boring cuts can be made to certain definite depths to be determined by a micrometer. The gauge which is used for this purpose can be made with a slight counterbore to clear the final reaming cutter which passes through the nose to size the hole for tapping. This reamer is used on the second

bar and is interchangeable with the former cutters just described.

The counter-bore into which the flange of the base plug fits is formed by a cutter which is located in a suitable position on either of the bars. By making this cutter of suitable shape it faces off the end to accurate overall length at the same time, after which the shell is ready for tapping.

The thread which is formed in the base of the shell to receive the base plug must be perfect so far as finish is concerned, the actual limits of variation in size being easily maintained, and not presenting such a problem as the production of perfect pitch, circularity, and smoothness of surface. The use of a thread milling machine followed by a tap, preferably collapsing, offers the most reliable and accurate method of threading. While tap makers may produce taps suitable for these large diameters, the necessity of terminating the thread close to a given point, throws undue work on the leading teeth of the dies.

Attempts to produce the work at the necessary rate on an engine lathe would spoil an undesirable percentage of the work, unless first-class skilled labor and accurate machines were used. It would, therefore, seem wise to make haste slowly and surely regarding this one operation. At all events it will be found best to do this work in a specially equipped machine with reliable help. The completion of this operation finishes group B.



## INDICATIONS OF A STEEL FAMINE

INDICATIONS are not wanting that if there is a continuance of the demand for steel for the manufacture of munitions throughout another year or so there will be a general steel famine—a famine which will be severely felt in this country. The most outstanding indication of this is to be found in the action of the United States Steel Corporation, which was referred to in these columns recently. The situation has shown no improvement since, but rather the contrary; the big American company continues its attitude, which is that prices have been withdrawn on all export business.

Canadian officials of the company have little to say further than that the demand for steel has been such that until the future is more clearly defined no more foreign orders will be accepted. It is not so much an indication that Canada may be indefinitely cut off from her American supplies, but the fact that U. S. Steel is forced to take such action is a startling revelation of the position of the whole market.

### Munitions Demand the Chief Cause

At the present time the chief feature of the steel trade is the munitions busi-

ness, especially in Canada. In the United States, as in this country, there has been heavy consumption for shells, and, on the other side of the line, this has been followed by a heavy domestic demand, in which the railroads have played a prominent part. This has had the effect of piling up orders for many months in advance.

The situation as regards munitions in Canada does not appear to be directly affected by the cutting off of American steel. In other words, supplies of steel for munitions manufacture have been booked months ahead by the Shell Committee. So far as munitions are concerned, then, the question is one largely of the future, but it undoubtedly creates a problem in connection with any orders that the Shell Committee may have in hand for which they have not booked steel and for orders to be placed in the future.

### The Domestic Situation

The domestic situation as regards steel products is more directly affected. It is doubtful if such an upheaval has ever occurred in the metal trades in this country as that brought about by the withdrawal of American prices. On wire, sheets, boiler plates, tubes, and many other lines, not to mention the higher manufactures of the metal, there are indications that the famine may not be long delayed if there is no relief offered—and there appears to be none in sight. Metal merchants state that they are not only told that there are no quotations, but the intimation is that their business is not wanted and propositions do not receive consideration.

This is a particularly difficult problem with the great bulk of Canadian steel being devoted to the manufacture of munitions, because we have become more dependent upon the American producers for the special products. The result is that, with the prospects of a future shortage, prices are being rapidly advanced on the many lines directly affected, and the outlook is for rising prices until such time as there is some definite assurance of supplies. If there should at this time arise a domestic movement similar to that in the United States the famine would almost immediately become an actual fact.—Financial Post.



**New Zealand Scheelite.**—A New Zealand lady has offered the Government the gift of a deposit of scheelite—an ore yielding tungsten, used in hardening of steel—containing 30,000 tons, now worth £631 per ton. The deposit, discovered in the Marlborough district of New Zealand several years ago, consists of three reefs, over which she holds the mineral rights. The offer is conditional upon all moneys received being paid over to wounded soldiers.

## WHAT ARE MONITORS?

THE bombardments of the Belgian coast, carried out by a squadron under the command of Admiral Bacon, claim our attention.

To commence with, General French has let us into the secret of the important naval post to which Admiral Bacon was appointed. This officer will be remembered because of his association with the submarine service in its early stages, as a member of the committee which approved of the Dreadnought design, and as the first captain of the Dreadnought. When war broke out, Admiral Bacon was connected with the Coventry Ordnance Works, and some criticism was passed on the appointment of a retired officer in preference to the rear-admirals still on the active list.

Some years ago the Germans carried out a series of experiments with the view of testing the efficacy of concealed shore batteries against ironclads, and the conclusion was reached that no country would risk her fighting ships in an attack on a defended coast.

After the first surprise attack on the Belgian coast by Admiral Hood's squadron, the enemy immediately studded the coast with batteries. No doubt they hoped that this would act as a deterrent to further attempts by our ships, but they had reckoned without the skill of our naval authorities.

### Vessel Features

The outstanding features of these vessels, which as a class are named after Ericsson's first "monitor," are shallow draught, small freeboard, low speed, heavy armament, and fairly efficient protection. The shallow draught renders them capable of working in shallow water, and this is an advantage in two ways: it permits of their working close inshore and in waters too shallow for a submarine to manoeuvre in without running suicidal risks. The shallow draught also means a small underwater target, which compensates for the lack of defensive qualities incidental to the slow speed.

The low freeboard makes these vessels a very small target for the land gunners. Briefly, the monitor represents the maximum hitting power carried in the smallest possible space, big offensive qualities in a small target.

These little vessels have overcome the elaborate plans of the enemy for the defence of the coast. They are the best possible reply to the enemy's move, and they show that, in spite of all that is urged against our administrators, we do possess men capable of finding the flaw in the enemy's plans, and resourceful enough to develop the means of profiting by their discovery.—Liverpool Journal of Commerce.



# PROGRESS IN NEW EQUIPMENT

A Record of New and Improved Machinery and Accessories for the Machine, Pattern, Boiler and Blacksmith Shops, Planing Mill, Foundry and Power Plant

## FLAT SURFACE GRINDING MACHINE FOR SHELL WORK

THE remarkable efficiency shown by disc grinders on shell work has led to their rapid adoption by numerous munitions factories in all parts of the world. As a result of this widespread use of their machines, Charles H. Besly & Co., 120F North Clinton Street, Chicago, U.S.A., have been enabled to incorporate many new and efficient features which make this machine invaluable to makers of shells up to 4.72 in., or 120 mm. diameter.

The Besly shell grinder is illustrated in Fig. 1, with water hoods and piping removed to show construction. This shows the machine equipped with work

and may be worn down to 1 in. in depth before being discarded.

Fig. 2 shows the Besly shell grinder equipped with rotary chucks for accurately finishing the inner face of base plates or gas plugs for high explosive shells. The action of the grinding wheel rotates the work while grinding, producing work of extreme accuracy in flatness and angularity. Many munitions manufacturers have had trouble trying to produce base plates or gas plugs with the inner face flat and accurately at right angles to the axis of the thread on the plug. This plug is a difficult thing to hold rigidly enough to thread accurately and face flat and square. The Besly shell grinder with

section in such, and the square projection on base plate removed by sawing, twisting or grinding. Where gas plugs are threaded, the square projections are usually twisted off after the plugs are screwed home in the base of shell. Where the unthreaded, beveled gas plugs are used, this square projection is usually sawed off in power saw, although it is entirely practical to remove same by grinding.

After the square is removed, there is up to 1/16 in. of stock to be removed from the rear face of the gas plug (3/8 in. diameter) to bring same flush with base of shell. This grinding is accomplished on the shell grinder at the rate of 15 to 40 shells per hour, per operator,

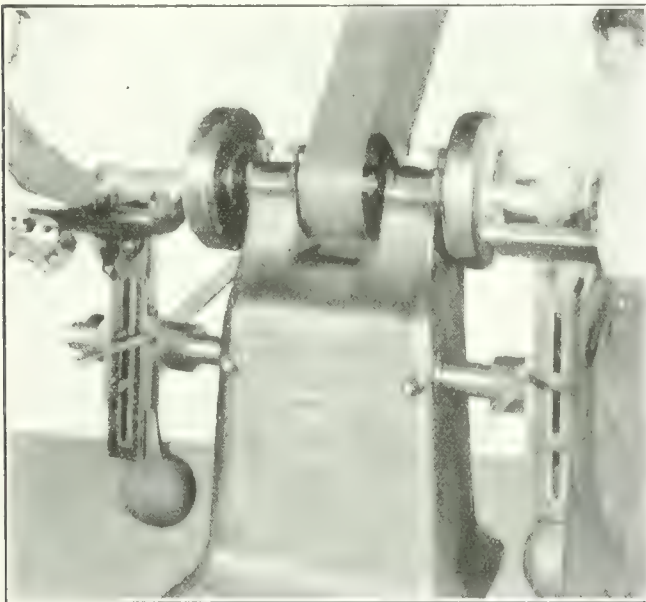


FIG. 1 GRINDER WITH WATER HOODS AND PIPING REMOVED.

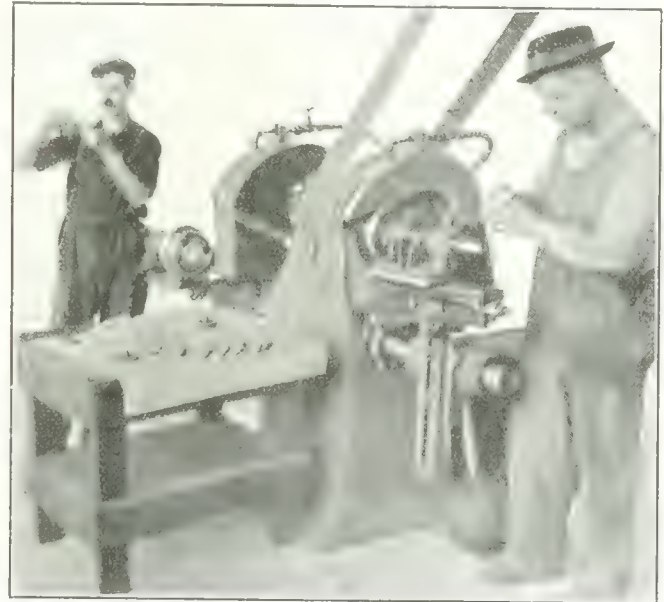


FIG. 2 GRINDER SHOWN EQUIPPED WITH ROTARY CHUCKS AND HOODS.

holders for removing stub ends left for centres on 3-in. shrapnel shells. Stub ends, 5/8 in. diameter by 3/8 in. long, are removed, and end of shell finished flat, smooth and square at the rate of 100 shells per hour per operator. The geared lever feed table on the grinder carries an adjustable micrometer stop screw, bringing the work accurately to length (if required) and duplicating.

The grinder spindle is driven by a 7-in. belt running 4,000 feet per minute, so ample driving power is provided. The grinding is done by vitrified ring wheels held in pressed steel chuck. It should be noted that as the grinding wheel wears away, it may be set out in the chuck as required. The ring wheels are 16 in. diameter, 4 in. deep when new,

rotary chucks, as illustrated in Fig. 2, overcomes this difficulty, because in the facing operation the plug is chucked from the threads. When required, this face may be ground with a camber of .002 in. to insure contact all over.

This special rotary chuck is also used with unthreaded, beveled jaws for grinding the unthreaded beveled base plates or gas plugs, now being used by a great many manufacturers of high explosive shells.

The time for this grinding operation is 60 to 80 gas plugs per hour, per operator, depending on the amount of stock to be removed.

These grinders are also supplied with work-holders for facing the end of 4.5 in. and smaller high explosive shells after base plate or gas plug has been in-

depending upon the amount of stock to be removed.

In connection with the water hoods, there are a pump and settling tank of 40-gallon capacity, with suitable settling compartments to extract the grindings from the cooling compound.

An exclusive feature on this machine is the provision of a geared lever on the table, providing a leverage of 26 to 1, making it easy for the operator to force the grinder to the limit of its capacity.

All wearing parts are renewable and adjustable for wear. The machine weighs over 3,000 pounds. The spindle is 2 in. diameter, and has a total bearing length of 18 in., the end thrust being taken on hardened and ground thrust bearings.

# Papers Read at the Recent Foundrymen's Convention

*Selected from the more important subjects presented for discussion before the Annual Convention of the American Foundrymen's Association and the American Institute of Metals at Atlantic City, N.J., during September, 1915. The papers cover a wide field of foundry and allied activity, the nature of the results and the completeness of the reports making them of particular interest to all who desire to keep in touch with metallurgical progress.*

## ESSENTIAL ELEMENTS OF SHERARDIZING\*

By S. Trood

**B**EFORE going into the description of sherardizing, it is well to mention something about zinc.

Zinc is a peculiar metal of pronounced characteristics. It is relatively low in malleability, ductility, tenacity and fusibility when compared with other common metals. Zinc has a melting point of 419 deg. C. and under atmospheric pressure a boiling point of 918 deg. C. While under vacuum, the boiling point is reduced to 548 deg. C. On the basis of silver at 100, zinc has an electrical conductivity of 29, a heat conductivity of 36, and is practically non-corrosive in the atmosphere, a thin protecting coating of carbonate of zinc forming upon it. Zinc is one of the highest electropositive metals, having a potential of plus 0.493 volts.

Although many of the common metals date their discovery to prehistoric times, yet zinc was unknown as a metal until discovered by Paracelsus in 1520. Previous to this, however, the action of zinc ores upon copper under action of heat was well known. Henchel in 1271 published an account of his discovery that metals when heated in calamine changed their properties, and in 1740, John Champion, of Bristol, England, obtained a patent for the process. Two of the processes of smelting zinc to-day date back to 1805 for the Belgian process and 1897 for the Sicilian process. In the United States, the Government was the first to use zinc, making the standard of weight and measure from brass.

It has only been within the last century that zinc has been used commercially as a protection against corrosion, and as a proof that the tendency of using zinc is toward the conservation of natural resources, it will be seen that by comparing the production of zinc and steel for the last four decades, the large increase in each has been running parallel for the corresponding years.

### Process Features

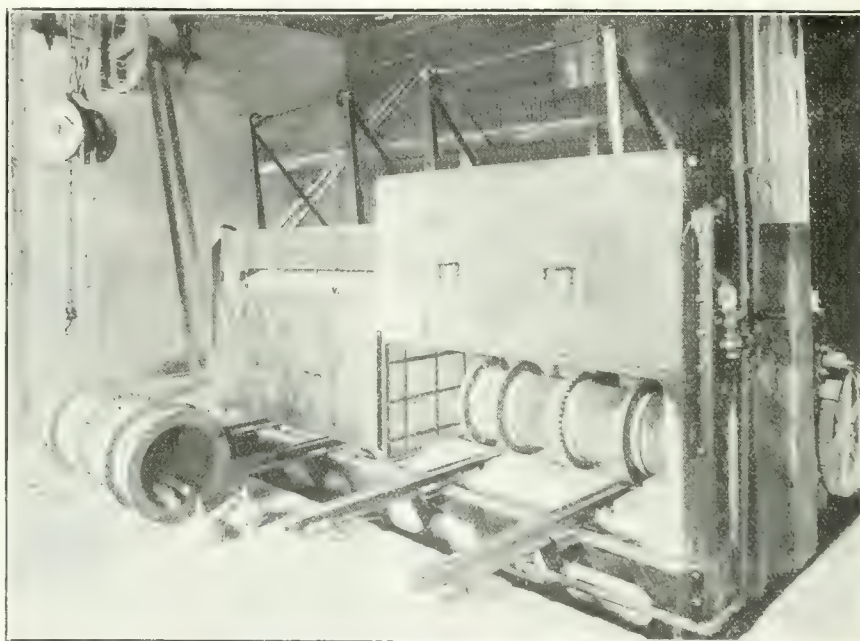
In general, the process of sherardizing consists in treating in zinc dust, articles which it is desired to rust-proof. The zinc dust consists mainly of finely powdered metallic zinc with zinc oxide.

\*Paper read at the American Institute of Metals Convention, held in Atlantic City, N.J.

After packing in a suitable container, the whole is heated for a certain period of time, cooled and articles then removed from the zinc dust. From everyday practice, we note that if we desire uniform results in a manufacturing proposition, we must have uniformly arranged details. So far as the sherardizing is concerned, the uniformity of each step in the process is very vital and necessary for success. In trying to explain what happens in the drum, the necessity of uniformity will explain itself.

Zinc dust is in a very finely divided state, and each particle covered with

charge. From this, it follows that the microscopically small atmospheres of zinc vapor surrounding these dust particles are charged electrically, and due to their minute size, they may be considered to have all the properties of ions. Iron being heated, also emanates gases which produce ionic charges. Iron and zinc have different electrical potentials, and, therefore, the ionic charges of zinc and iron vapors will have a different potential. If this is a fact, then discharges must occur. Ionic discharges precipitate solids from gases, and in our case zinc and traces of iron would be precipitated.



TWO COMPARTMENT SHERARDIZING FURNACE, TAKING IS IN 36 IN. DRUM. INSTALLED IN PLANT OF CHAMBERS LTD., TORONTO. THE FURNACE IS ARRANGED TO HANDLE MATERIAL UP TO 11 FT. 6 IN. LONG

zinc oxide. In this condition, zinc could be heated above the melting point without fear of liquefying the mass, and because the zinc oxide is quite high fire-resisting material of inert nature, it prevents small particles of heated zinc uniting together and creating a solid liquid mass. It is also a well-established fact that under these conditions solid matter can be made to sublime; in other words, a solid can be brought to a vapor, overstepping the liquid form.

According to authorities, vapor tension for a small particle is greater than vapor tension for a big body, due to the difference in the ratio between surface and volume. Armstrong, Thompson, and other scientists have shown that a gas emanated from a solid has an electrical

### Atmospheric Effect

Assuming once more that the theory is correct, the atmospheric pressure will have considerable effect on the process, as the vapor tension of gases will vary with the pressure, and the gases will be more readily emanated in vacuum. If we make use of a considerable vacuum, for instance, 28 ins. of mercury, the ionic discharge would be very effective. To prove this, I created a vacuum in a small sherardizing drum. In this case, the precipitation of zinc and iron took place at a much lower temperature and in considerably shorter time. Results were produced in ten minutes in a vacuum, which would require six hours at the same temperature, but under atmospheric pressure.



It is a well known fact that the electric potential is higher for pure zinc than for a mixture of gases. Therefore it is quite advantageous to have pure zinc dust and the iron in as pure a state as possible. As before stated, zinc is one of the metals which has the lowest difference in temperature between melting and boiling point, and this difference is quite low under vacuum. This is another proof that, with pure zinc dust under vacuum, the vapors will be created much more readily, ionically charged and precipitate the solids upon the surface.

#### Zinc Dust and Heat Factors

From the above, we can draw the conclusion that uniformity of zinc dust is a very important factor. Uniformity of heat, however, is of just the same importance, since the higher the temperature, the greater is the emanation of gases and, therefore, precipitation of solids. This may be seen on sherardized metal in the typical "color lines."

With every increase of temperature, with all conditions the same, the precipitation of solids increases and creates a deposit of a different character, and the same is true with a decrease in temperature, which retards the process and creates a less dense coating. These differences, which produce the stratified appearance or lines of color, are quite distinct under a microscope and may explain the very fine microscopic checks. That the quality of iron to be sherardized has a similar effect on the process can also be readily understood, as emanation of gases from iron depends greatly upon its composition. Particles imbedded or stuck on the surface may also change the potential.

The last great factor in the process is time. It is self-evident that the effect of precipitation will continue so long as the conditions are favorable to create the effect. To repeat:—1st, composition and quality of the surface of the iron; 2nd, composition and uniformity of zinc dust; 3rd, proper uniform temperature; 4th, time, are the most essential factors in the process of sherardizing. The practical side of sherardizing depends solely upon the four factors just mentioned. Sherardizing is mostly applied to steel and iron in all its forms. Articles which could not be heated, should not be sherardized. All material should be examined and rejected if it is scaly, covered with silica or any other impurities.

#### Preparing Surfaces for Sherardizing

The best method of removing the impurities—in other words, preparing the surfaces to be sherardized—is shot air blasting. This method is fundamentally the best, because in sand blasting particles of sand or silica penetrate the pores of the iron and are very disadvantageous. Pickling requires great skill

and must be done very carefully, as very often sulphates or phosphates are created on the surface, and if washed in alkalies, very often go into colloidal state. In other words, they become insoluble and very hard to remove. Another disadvantage of pickling is that the traces of salts, alkalies or acids when heated, may produce a retarding result so far as the ionic charges are concerned.

There are different zinc dusts on the market and those coming within the following limits would be the most advantageous:

Zinc between 85% and 90%.

Zinc oxide between 8% and 10%.

Lead between 1% and 1.5%.

Other impurities between .5% and 1%.

The three most important elements to be kept near the above percentages are:

Zinc which ought not to be below 85%.

Zinc oxide which ought not to be below 8%.

Lead which ought to be kept down to about 1.25%.

Although good sherardizing may be obtained if some variations from the above exist, the best results will be obtained if the percentages are kept within these limits. Lead must be kept down to the least practical amount, as experiments have shown that, when its percentage runs too high, lumpy deposits will appear on the sherardized plain surface and will also clog threads.

Free iron must be separated from the zinc dust as much as practice will allow, and in a well-established plant it is being done at least once in four weeks. This will remove surplus small particles of iron, which are liable to become lodged between the jaws or cotter pins, etc., and thus cause trouble in assembly. By cleaning the dust this way, the mechanical incorporation of small percentages of iron dust in the coating is also prevented. The weekly analysis of the working dust should show the iron content.

It was mentioned above that the size of particle has an effect on a vapor tension. Therefore, zinc dust must be kept uniform in size. When the zinc becomes caked or lumpy, it should be run through a tumbling barrel and sifted through at least 80-mesh screen. To keep practically the same metallic content, it is necessary to add to every charge, between 8% to 10% of virgin zinc dust. Weekly analysis of zinc dust should be made and the samples taken from the working zinc dust when it is run soft, and well mixed together in one or several sherardizing drums.

In the question of temperature, it should be understood that there is practically no limitation. If a very long time for the process is allowed, low temperature could be used, but this is not practical and, therefore, a higher tem-

perature will have to be reached. Also, the drums or containers are of metal and a working temperature must be of such a degree as not to destroy the working of the apparatus. In one case the temperature would be quite high and in another case it would be quite low.

#### Apparatus Feature

Any practical apparatus which would keep a uniform temperature throughout, would be advantageous, and, in this respect, the electrically heated drum would be the more suitable, as here the control of the heat as to uniformity, time and degree is ideal, and when electrical apparatus is used, 350 to 375° C. would be the most suitable temperature, as within this range a very practical and serviceable apparatus can be designed. There are some successful installations where gas as a means of heat is employed, and here the drums are passing through a continuous tunnel oven going gradually from the cold to the hottest zone and then to the cold.

The size of the container and construction have very much to do with uniformity of heat, as, if the dimensions are large, longer time is required to heat the apparatus. Zinc dust is a very poor conductor of heat and articles hardly touching each other do not offer a good path for heat.

Continuous rotation of the drums eliminates to a certain extent those disadvantages, since it produces a uniform mixing of the contents of the drum and allows the more heated particles on the outside to convey the heat to the centre. Packing the drum too tight will prevent a free flow of dust and heat, and consequently different temperature zones will occur with resulting different degrees of deposit.

#### Thickness of Deposit

After deposit of zinc begins, with all other factors well established, the thickness of the deposit depends solely upon the time. All other factors being constant, a good coating depends upon time, and if the process is continued too long, a brittle and easily chipped coating will result. This is due to the wide difference in co-efficient of expansion and contraction between the zinc and iron, which have co-efficients of .00002532 and .00001166 per degree centigrade, respectively.

The coating which is being deposited when the temperature is going up is the most dense and durable; next in quality will be the coating of the uniform temperature period and the least when the temperature is going down. If small articles are treated where sharp profiles and threads are present, the time element is most vital. It is very hard to control

any certainty in the time element, but in every case it has to be established in accordance with other factors.

The relation of these vital factors to the process of sherardizing is such that each one is dependent on the other, with the result that the variation of the one will require a variation of the others. Therefore, in order to simplify the process and make it practical on a manufacturing basis, it is found that uniformity is the essential element. This is practically all that need be said on sherardizing, although much could be written on sherardizing for special conditions.

I have come in contact with practically every large sherardizing plant in the United States, and, with very few exceptions, they still have some trouble with the process. After analyzing the troubles, I found that the uniformity and relation of these factors was not properly maintained.

I know at least one concern which—by using shot air blasting; very uniform and high metallic content zinc dust, which is periodically cleaned and magnetically separated and sifted; which uses electrically heated drums of proper design, giving a controllable uniform temperature—obtain very desirable results on sherardizing. The purpose of this paper, however, is not to describe the everyday methods of sherardizing, but to point out the essential elements of the process.

The next step in sherardizing will be a continuous method in vacuum, for by this method, the narrow margins of the atmospheric pressure process will be broadened and more uniform results with less effort will be obtained.



### CANADA WILL NOT MAKE BIG GUNS

IT is understood that Canada will not have a big gun industry just yet. The Imperial Government has decided not to proceed with the establishment of a plant for the manufacture of heavy artillery in Canada, for the present at least. Word was received in Ottawa recently to that effect.

At a conference which took place some weeks ago between military officials here and representative Canadian manufacturers and financiers, the question of constructing heavy guns was discussed and the opinion of the conference was that such an undertaking was feasible. Although it was never so stated officially, it is known that this opinion was confirmed subsequently by Sir Frederick Donaldson and General Mahon, who came to Canada to look over the ground at the instance of the War Office. These experts visited the various steel plants of Eastern Canada

and conducted a thorough investigation into the resources which could be drawn upon for the construction of heavy guns. They returned to England on the completion of this investigation and are understood to have reported favorably upon the proposal to establish a big gun industry on a moderate scale.

The Imperial Government's reason in coming to an adverse decision is not known, although the question of time may have been one of the chief considerations. It has been stated that a Canadian artillery plant could not do very much in the way of output inside of six months. The establishment of such an industry would have meant a distribution of orders amounting to many millions, the proposal having been to have the parts manufactured at various points and assembled at one or two large plants in the East. Although the decision of the War Office does not preclude a renewal of the proposal at some future time, it is considered here to be unlikely that any further steps will be taken. It is pointed out, however, that there is plenty of work to be done in the production of shells and other munitions.



### EFFECTIVE FORCE BETWEEN DRIVING BELT AND PULLEY

THE law of friction of solid bodies applies fully only to the case of surfaces of belts and pulleys clean and absolutely free of grease, and the nearest approximation is the case of new belts having very little grease on them. If, on the other hand, there clings, more or less perfectly, on the smooth surfaces of the belt and pulleys a thin skin of liquid, then, in accordance with the amount of its adhesion, the magnitude of the effective force varies as the internal friction of the liquid, and thus becomes functionally dependent on all other variables; in particular the effective surface, the gliding velocity, and the temperature and viscosity of the adhering liquid. Under such conditions new forces come into operation, in some cases many times greater than those acting in the case of pure friction between solid bodies. The properties of the belt material become of secondary importance, while the properties and amount of belt grease assume a pre-eminent importance.

#### Belt Grease Importance

The presence of a uniformly thin and smooth skin of grease on the gliding surface of a belt has a double effect. In the first place, it makes possible the rise of large forces between belt and pulley, especially with increase in gliding velocity. Second, it protects the surface of the belt. In particular, for high belt velocities, belts should be as flexible, soft and well greased as possible. In the case of a slightly greased belt, the applica-

tion of a proper belt grease to the clean surface can help in building up a thin skin of grease between the belt and the smooth pulley which raises the effective forces as has been proved by experiments.

When there is a skin of liquid present, the magnitude of the effective forces increases, in the first place, with the gliding velocity. This makes the belt drive stable as regards overloads (up to certain definite limits of this latter): when large peripheral forces have to be transferred, higher gliding velocities must be used, and they lead to increased frictional resistances on the assumption that the temperature remains permanently constant. The average gliding velocity of the belt and pulley increases (all other conditions being the same and peripheral forces transferred being equal), approximately in proportion to the belt speed. In the high speed belts, therefore, usually larger frictional forces are in operation.

The superiority of large pulley diameters and comparatively wide belts, established by experiments, is partly explained by the functional dependence existing, in the case of well-greased belts, between the magnitude of the effective forces and that of the gliding surfaces.

With rough surfaces of pulleys the effective force is greater than with the smooth pulleys only when the velocity of gliding is negligibly small. Otherwise it is always smaller, the more so the more perfectly the face of the belt is covered by a thin skin of fluid. As a result rough pulleys not only cut down the life of the belt through increased wear, but they do not accomplish the purpose of increasing the frictional resistance in gliding.—Page's Weekly.



### COLLINGWOOD SHIPBUILDING CO.

CONSIDERABLE activity is likely to be seen during the coming winter at the plant of the Collingwood Shipbuilding Co., Collingwood, Ont., not only in the production of new vessels, but in the matter of general repairs as well. Construction is approaching an advanced stage on the two vessels for the Imperial Oil Co., and as briefly noted in another section of this issue, an order has been secured for a large freighter, particulars of which are as follows: Length, 550 ft.; beam, 58 ft.; depth, molded, 31 ft.; gross tonnage, about 8,000; deadweight on 19 ft. 6 in. mean draft, 11,000 tons. Three Scotch type boilers each 13 ft. diameter by 11 feet long, will be installed, and the propelling machinery will consist of one set of triple expansion engines. The vessel will be built on the arch principle with deep double bottom and side tanks, the design being such as to enable either grain or coal to be carried



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## "PLAYING UP" STEEL

THE more or less prevalent inactivity, long drawn out, on every section of a far-flung battle line, and the natural expectation that something big might materialize at any time, appear to have not only unsettled and unnerved our people to an extraordinary degree, but have engendered a disposition in many quarters to "start something" on their own initiative, irrespective of its having foundation on fact, or of the consequences.

We have in large degree got beside ourselves since the manufacture of war munitions became established in our midst. The paucity of orders placed with our manufacturers as compared with those distributed among American concerns; the disposition to keep Canadian contracts within a limited and select circle; the fault-finding with and whisperings of graft on the part of those charged with the administration of our public affairs; the glaring and unrestrained speculation in war stocks, and the giddy heights to which these have attained; the outcry to tax

our manufacturers on their war profits, and the insistent demand for a Minister of Munitions, these as constituting the more outstanding features of recent months may be cited as exemplary of the nervous tension under which we are laboring.

Each of the foregoing has attained to a certain fever heat of passion, in some the temperature exceeded, but, in all, the cooling off is now a process. The war must needs be kept up, however, and just at the moment "steel" is in the ring, and overshadows all else. The gods of war, we are made believe, have decreed a steel famine, and, to challenge the possibility, no matter how reasonable one's deductions might indicate otherwise, would of course be futile. This steel famine cry has got to run its course, and will do so quite as worthily as its initiation deserves. It is unfortunate, however, that the cry has been raised, and perhaps more so that it has found so many adherents and supporters.

Steel prices covering every description of commodity into which the material enters have advanced to a prodigious extent, and we are quite certain that the limit has not nearly been reached. The demand for war munitions has brought about the extraordinary demand for steel, and the present hue and cry notwithstanding, there is little doubt but that the former will be satisfactorily met by the latter. Steel for structural purposes, outside of shipbuilding, is in but light demand, and that for otherwise and domestic requirements may not easily be assumed urgent. In any case, it is a question of price to be paid by the consumer, and is dependent on the latter's attitude—in war-time just as in peace-time.

A shortage is, we believe, imminent in billets and other forms of semi-finished steel, principally, of course, because of the extraordinary requirements of Britain and her Allies, and secondarily because the domestic requirements of this North American continent begin again to loom up. Whether, however, the latter will continue to develop to any greater extent in the near future is problematical, in view of the fact that prices are already abnormally high, and give every evidence of reaching still more prohibitive figures.

Already we have reports that several large consumers of semi-finished steel contemplate the early closing down of their plants—at least temporarily. In spite of this, even if the reports have a meantime real foundation, we do not anticipate any such untoward happening. As we stated a few weeks ago, there are limitations to the extent that our big corporations are prepared to go as regards prices of raw and semi-finished steel, and exemplification of this is seen in the decision of the Pennsylvania Railroad System to take no further action meantime regarding the addition of some 11,000 freight cars to its rolling stock which it contemplated.

While agreeing that our domestic requirements may not be neglected, we cannot understand why apparently herculean efforts should be made to boom them now, except it be to add impetus to the price raising propaganda. This domestic demand, as it is termed, has burst into an altogether too sudden prominence to be reckoned as enduring, and instead of the second quarter of the New Year marking the crucial or famine period, there is not a little possibility that the Allies, through the conservation now being enforced, will have both lessened the demand for munitions' steel from beyond their own borders, but will have materially lessened the market quotations for steel for all purposes everywhere.

We are still of opinion that no real domestic demand for steel will materialize until war prices of that commodity in any form tend downward towards those associated with peace-time activities. We also believe that the war needs of the Allies will be successfully met.

# SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

## PIG IRON.

Grey forge, Pittsburgh .....	\$16 45	
Lake Superior, charcoal, Chicago .....	17 25	
Ferro nickel pig iron (Soo) .....	25 00	
<b>Montreal Toronto.</b>		
Middlesboro, No. 3 .....	\$24 00	
Carron, special .....	25 00	
Carron, soft .....	25 00	
Cleveland, No. 3 .....	24 00	
Clarence, No. 3 .....	24 50	
Glengarnock .....	28 00	
Summerlee, No. 1 .....	30 00	
Summerlee, No. 3 .....	29 00	
Michigan charcoal iron .....	28 00	
Victoria, No. 1 .....	24 00	23 00
Victoria, No. 2X .....	23 00	23 00
Victoria, No. 2 plain .....	23 00	23 00
Hamilton, No. 1 .....	23 00	23 00
Hamilton, No. 2 .....	23 00	23 00

## FINISHED IRON AND STEEL.

<b>Per Pound to Large Buyers.</b>		<b>Cents.</b>
Common bar iron, f.o.b., Toronto ..	2 50	
Steel bars, f.o.b., Toronto .....	2 75	
Common bar iron, f.o.b., Montreal ..	2 50	
Steel bars, f.o.b., Montreal .....	2 75	
Twisted reinforcing bars .....	2 55	
Bessemer rails, heavy, at mill .....	1 25	
Steel bars, Pittsburgh .....		
Tank plates, Pittsburgh .....		
Beams and angles, Pittsburgh .....		
Steel hoops, Pittsburgh .....		
<b>F.O.B., Toronto Warehouse.</b>		<b>Cents.</b>
Steel bars .....	2 75	
Small shapes .....	2 75	
<b>Warehouse, Freight and Duty to Pay.</b>		<b>Cents.</b>
Steel bars .....	2 10	
Structural shapes .....	2 20	
Plates .....	2 29	
<b>Freight, Pittsburgh to Toronto.</b>		
18.9 cents carload; 22.1 cents less carload.		

## BOILER PLATES.

	<b>Montreal</b>	<b>Toronto</b>
Plates, 1/4 to 1/2 in., 100 lb. \$2 75	\$2 75	\$2 50
Heads, per 100 lb. .... 2 80	2 80	2 75
Tank plates, 3-16 in. .... 3 00	3 00	2 80

## OLD MATERIAL.

<b>Dealers' Buying Prices. Montreal. Toronto.</b>		
Copper, light .....	\$13 75	\$12 75
Copper, crucible .....	16 25	15 00
Copper, unch-bleed, heavy ..	15 75	14 50
Copper, wire, unch-bleed ..	15 75	14 50
No. 1 machine compos'n ..	12 00	11 75
No. 1 compos'n turnings ..	11 00	10 00
No. 1 wrought iron .....	10 00	9 50
Heavy melting steel .....	9 00	9 00
No. 1 machine cast iron ..	13 50	13 00
New brass clippings .....	11 50	11 00
No. 1 brass turnings .....	9 50	9 00
Heavy lead .....	5 25	5 00

Tea lead .....	\$ 4 25	\$ 1 00
Scrap zinc .....	13 50	12 00

## W. I. PIPE DISCOUNTS.

Following are Toronto jobbers' discounts on pipe in effect Nov. 5, 1915:

	<b>Buttweld</b>		<b>Lapweld</b>	
	<b>Black</b>	<b>Gal.</b>	<b>Black</b>	<b>Gal.</b>
<b>Standard</b>				
1 1/2 in. .... 62	38 1/2			
2 in. .... 67	47 1/2			
3 1/2 to 1 1/2 in. .... 72	52 1/2			
2 in. .... 72	52 1/2	68	48 1/2	
2 1/2 to 4 in. .... 72	52 1/2	71	51 1/2	
4 1/2, 5, 6 in. ....		69	49 1/2	
7, 8, 10 in. ....		66	44 1/2	
<b>X Strong P. E.</b>				
1 1/2 in. .... 55	38 1/2			
2 in. .... 62	45 1/2			
3 1/2 to 1 1/2 in. .... 66	49 1/2			
2, 2 1/2, 3 in. .... 67	50 1/2			
2 in. .... 62	45 1/2			
2 1/2 to 4 in. .... 65	48 1/2			
4 1/2, 5, 6 in. .... 65	48 1/2			
7, 8 in. .... 58	39 1/2			
<b>XX Strong P. E.</b>				
1 1/2 to 2 in. .... 43	26 1/2			
2 1/2 to 6 in. ....		42	25 1/2	
7 to 8 in. ....		39	20 1/2	
<b>Genuine Wrot Iron.</b>				
3/8 in. .... 56	32 1/2			
1 1/2 in. .... 61	41 1/2			
3 1/2 to 1 1/2 in. .... 66	46 1/2			
2 in. .... 66	46 1/2	62	42 1/2	
2 1/2, 3 in. .... 66	46 1/2	65	45 1/2	
3 1/2, 4 in. .... 65	45 1/2			
4 1/2, 5, 6 in. .... 62	42 1/2			
7, 8 in. .... 59	37 1/2			
<b>Wrought Nipples.</b>				
4 in. and under .....			77 1/2	
4 1/2 in. and larger .....			72	
4 in. and under, running thread. ....			57 1/2	
<b>Standard Couplings.</b>				
4 in. and under .....			60	
4 1/2 in. and larger .....			40	

## MILLED PRODUCTS.

Sq. & Hex Head Cap Screws 65 & 50	
Sq. Head Set Screws .....	70 & 50
Rd. & Fil. Head Cap Screws .....	45
Flat & Bnt. Head Cap Screws .....	40
Finished Nuts up to 1 in. ....	70
Finished Nuts over 1 in. ....	70
Semi-Fin. Nuts up to 1 in. ....	70
Semi-Fin. Nuts over 1 in. ....	72
Studs .....	65

## METALS.

	<b>Montreal.</b>	<b>Toronto.</b>
Lake Copper, carload .....	\$21 50	\$20 75
Electrolytic copper .....	21 25	20 50
Castings, copper .....	21 00	20 50
Tin .....	16 00	15 00
Spelter .....	20 00	21 00
Lead .....	6 75	7 00
Antimony .....	42 00	40 00
Aluminum .....	62 00	65 00

Prices per 100 lbs.

## BILLETS.

	<b>Per Gross Ton</b>	
Bessemer, billets, Pittsburgh ..	\$28 00	
Open-hearth billets, Pittsburgh ..	29 00	
Forging billets, Pittsburgh .....	50 00	
Wire rods, Pittsburgh .....	38 00	

## NAILS AND SPIKES.

Standard steel wire nails,		
base .....	\$2.70	\$2.75
Cut nails .....	2 50	2 70
Miscellaneous wire nails ..	75 per cent.	
Pressed spikes, 5/8 diam., 100 lbs. ....	2 85	

## BOLTS, NUTS AND SCREWS.

	<b>Per Cent.</b>	
Coach and lag screws .....	60 and 5	
Stove bolts .....	82 1/2	
Plate washers .....	40	
Machine bolts, 3/8 and less .....	65	
Machine bolts, 7-16 and over ....	50	
Blank bolts .....	50-71 1/2	
Bolt ends .....	50-71 1/2	
Machine screws, iron, brass .....	35	
Nuts, square, all sizes .... 3 3/4 c per lb off		
Nuts, hexagon, all sizes .... 4 1/4 c per lb. off		
Iron rivets .....	67 1/2	
Boiler rivets, base, 3/4-in. and larger .....	\$3.75	
Structural rivets, as above .....	3.75	
Wood screws, flathead,		
bright .....	85, 10, 7 1/2, 10 p.c. off	
Wood screws, flathead,		
brass .....	75 p.c. off	
Wood screws, flathead,		
bronze .....	70 p.c. off	

## LIST PRICES OF W. I. PIPE.

Nom. Diam.	Standard Price per ft.	Extra Strong.		D. Ex. Strong.	
		Sizes Ins.	Price per ft.	Sizes Ins.	Price per ft.
1/8 in.	\$ .05 1/2	1/8 in.	\$ .12	1 1/2	\$ .32
1/4 in.	.06	1/4 in.	.07 1/2	3 1/4	.35
3/8 in.	.06	3/8 in.	.07 1/2	1	.37
1/2 in.	.08 1/2	1/2 in.	.11	1 1/4	.52 1/2
3/4 in.	.11 1/2	3/4 in.	.15	1 1/2	.65
1 in.	.17 1/2	1 in.	.22	2	.91
1 1/4 in.	.23 1/2	1 1/4 in.	.30	2 1/2	1.37
1 1/2 in.	.27 1/2	1 1/2 in.	.36 1/2	3	1.86
2 in.	.37	2 in.	.50 1/2	3 1/2	2.30
2 1/2 in.	.58 1/2	2 1/2 in.	.77	4	2.76
3 in.	.76 1/2	3 in.	1.03	4 1/2	3.26
3 1/4 in.	.92	3 1/4 in.	1.25	5	3.86
4 in.	1.09	4 in.	1.50	6	5.32
4 1/2 in.	1.27	4 1/2 in.	1.80	7	6.35
5 in.	1.48	5 in.	2.08	8	7.25
6 in.	1.92	6 in.	2.86		
7 in.	2.38	7 in.	3.81		
8 in.	2.50	8 in.	4.34		
8 in.	2.88	9 in.	4.90		
9 in.	3.45	10 in.	5.48		
10 in.	3.20				
10 in.	3.50				
10 in.	4.12				



**COKE AND COAL**

Solvay Foundry Coke .....	\$6.25
Connellsville Foundry Coke .....	5.65
Yough Steam Lump Coal .....	3.63
Penn. Steam Lump Coal .....	3.63
Best Slack .....	2.99

Net ton f.o.b. Toronto.

**COLD DRAWN STEEL SHAFTING**

At mill .....	25%
At warehouse .....	20%

Discounts off new list. Warehouse price at Montreal and Toronto.

**MISCELLANEOUS**

Solder, half-and-half .....	0.25
Putty, 100-lb. drums .....	2.70
Red dry lead, 100-lb. kegs, per cwt.	9.65
Glue, French medal, per lb. ....	0.15
Tarred slaters' paper, per roll ...	0.95
Motor gasoline, single bbls., gal. ...	0.25 1/2
Benzine, single bbls., per gal. ....	0.25
Pure turpentine, single bbls. ....	0.85
Linseed oil, raw, single bbls. ....	0.85
Linseed oil, boiled, single bbls....	0.88
Plaster of Paris, per bbl. ....	2.50
Plumbers' Oakum, per 100 lbs....	4.50
Lead Wool, per lb. ....	0.11
Pure Manila rope .....	0.16
Transmission rope, Manila .....	0.20
Drilling cables, Manila .....	0.17
Lard oil, per gal. ....	0.73
Union thread cutting oil .....	0.60
Imperial quenching oil.....	0.35

**POLISHING DRILL ROD**

Discount off list, Montreal and To-	
ronto .....	40%

**PROOF COIL CHAIN.**

1/4 in. ....	\$9.00
5-16 in. ....	5.90
3/8 in. ....	4.95
7-16 in. ....	4.55
1/2 in. ....	4.00
9-16 in. ....	4.20
5/8 in. ....	4.10
3/4 in. ....	3.95
7/8 in. ....	3.80
1 inch .....	3.70

Above quotations are per 100 lbs.

**TWIST DRILLS**

Carbon up to 1 1/2 in. ....	55%
Carbon over 1 1/2 in. ....	25%
High Speed .....	
Blacksmith .....	55%
Bit Stock .....	.60 and 5
Centre drill .....	20
Ratchet .....	20
Combined drill and c.t.s.k. ....	15

Discounts off standard list.

**REAMERS**

Hand .....	25%
Shell .....	25%
Bit Stock .....	25%
Bridge .....	65%
Taper Pin .....	25%
Centre .....	25%
Pipe Reamers.....	80%

Discounts off standard list.

**IRON PIPE FITTINGS.**

Canadian malleable, A, 25 per cent.; B and C, 35 per cent.; cast iron, 60; standard bushings, 60 per cent.; headers, 60; flanged unions, 60; malleable bushings, 60; nipples, 75; malleable, lipped unions, 65.

**TAPES**

Chesterman Metallic, 50 ft. ....	\$2.00
Lufkin Metallic, 603, 50 ft. ....	2.00
Admiral Steel Tape, 50 ft. ....	2.75
Admiral Steel Tape, 100 ft. ....	4.45
Major Jun., Steel Tape, 50 ft. ...	3.50
Rival Steel Tape, 50 ft. ....	2.75
Rival Steel Tape, 100 ft. ....	4.45
Reliable Jun., Steel Tape, 50 ft. ..	3.50

**SHEETS.**

	Montreal	Toronto
Sheets, black, No. 28....	\$3.20	\$3.20
Canada plates, dull.		
52 sheets .....	3 25	3 25
Canada Plates, all bright..	4 60	4 75
Apollo brand, 10 3/4 oz.		
galvanized .....	5 50	5 75
Queen's Head, 28 B.W.G.	6 00	5 95
Fleur-de-Lis, 28 B. W. G....	5 75	5 75
Gorbal's Best, No. 28 ...	6 00	6 00
Viking metal, No. 28 ...	5 25	5 25
Colborne Crown, No. 28..	5 70	5 80
Premier No. 28 .....	5 40	5 50
Premier, 10 3/4 oz. ....		5 75

**BOILER TUBES.**

Size	Seamless	Lapwelded
1 in. ....	\$14 25	
1 1/4 in. ....	15 00	
1 1/2 in. ....	15 00	
1 3/4 in. ....	15 00	
2 in. ....	15 00	9 50
2 1/4 in. ....	16 50	10 50
2 1/2 in. ....	17 50	11 00
3 in. ....	25 00	12 50
3 1/2 in. ....	28 00	15 00
4 in. ....	34 00	19 00

Prices per 100 feet, Montreal and Toronto.

**WASTE.**

	WHITE.	Cents per lb.
XXX Extra .....		0 11 1/2
X Grand .....		0 11
XLGR .....		0 10 1/4
X Empire .....		0 10 1/4
X Press .....		0 08 3/4

**COLORS.**

Leon .....	0 07 3/4
Standard .....	0 07
Popular .....	0 06 1/4
Keen .....	0 05 1/2

**WOOL PACKING.**

Arrow .....	0 17
Axle .....	6 12
Anvil .....	0 00
Anchor .....	0 07

**WASHED WIPERS**

Select White .....	0 08 1/2
Mixed Colored .....	0 06 1/4
Dark Colored .....	0 05 1/4

This list subject to trade discount for quantity.

**BELTING RUBBER**

Standard .....	.50%
Best grades .....	.30%

**BELTING—NO. 1 OAK TANNED.**

Extra heavy, single and d'ble, 40 & 10%	
Standard .....	.50%
Cut leather lacing, No. 1.....	\$1.20
Leather in sides .....	1.10

**ELECTRIC WELD COIL CHAIN B.B.**

1 1/8 in. ....	\$12.75
3-16 in. ....	8.85
1 1/4 in. ....	6.15
5-16 in. ....	4.90
3/8 in. ....	4.05
7-16 in. ....	3.85
1/2 in. ....	3.75
5/8 in. ....	3.60
3/4 in. ....	3.60

Prices per 100 lbs.

**PLATING CHEMICALS**

Acid, boracic .....	\$ .15
Acid, hydrochloric .....	.05
Acid, hydrofluoric .....	.06
Acid, nitric .....	.10
Acid, sulphuric .....	.05
Ammonia, aqua .....	.08
Ammonium carbonate .....	.15
Ammonium chloride .....	.11
Ammonium hydrosulphuret .....	.35
Ammonium sulphate .....	.07
Arsenic, white .....	.10
Copper sulphate .....	.10
Cobalt sulphate .....	.50
Iron perchloride .....	.20
Lead acetate .....	.16
Nickel ammonium sulphate .....	.10
Nickel carbonate .....	.50
Nickel sulphate .....	.15
Potassium carbonate .....	.40
Potassium sulphide (substitute)..	.20
Silver chloride .....	(per oz.) .65
Silver nitrate .....	(per oz.) .45
Sodium bisulphite .....	.10
Sodium carbonate crystals .....	.04
Sodium cyanide, 127-130% .....	.35
Sodium hydrate .....	.04
Sodium hyposulphite (per 100 lbs.)	3.00
Sodium phosphate .....	.14
Tin chloride .....	.45
Zinc chloride .....	.20
Zinc sulphate .....	.07

Prices Per Lb. Unless Otherwise Stated.

**ANODES**

Nickel .....	.47 to .52
Cobalt .....	1.75 to 2.00
Copper .....	.22 to .25
Tin .....	.45 to .50
Silver .....	.55 to .60
Zinc .....	.22 to .25

Prices Per Lb.

**PLATING SUPPLIES**

Polishing wheels, felt ....	1.50 to 1.75
Polishing wheels, bullneck.	.80
Emery in kegs .....	.41 1/2 to .06
Pumice, ground .....	.05
Emery glue .....	.15 to .20
Tripoli composition .....	.04 to .06
Crocus composition .....	.04 to .06
Emery composition .....	.05 to .07
Rouge, silver .....	.25 to .50
Rouge, nickel and brass....	.15 to .25

Prices Per Lb.

# The General Market Conditions and Tendencies

This section sets forth the views and observations of men qualified to judge the outlook and with whom we are in close touch through provincial correspondents.

**Montreal, Nov. 29, 1915.**—The closing days of November saw continued improvement in the trade conditions that have prevailed for the past few months, and the general feeling is that developments in this direction will be maintained. The exceptional open weather of the past few weeks is responsible for a record being made in the navigation history of the St. Lawrence, the present week being the latest in the history of the river that the gas buoys have been in place for night navigation. The last departure for a sea voyage is scheduled for November 30. Shipping companies have benefited greatly by the extension of harbor closing.

With the closing of navigation, increased activity will be manifest in the operation of the various railway systems, and their full equipment and rolling stock will be requisitioned to handle the transportation of goods to foreign ports.

The activity in the manufacture of supplies for the allied armies continues unabated. Orders have been awarded to manufacturers in this district for 600,000 pairs of shoes, and this may be added to at any time. The capacity of our cotton mills is taxed to the utmost to supply the domestic and army needs. Colored goods are subject to heavy advances, due to the inability to secure the necessary dyes.

Great inconvenience, we understand, is being experienced by Western farmers in certain districts, because the unprecedented crops have overcrowded the available capacity of the grain elevators; in many instances large quantities of bagged grain being stacked in the open field and inadequately protected from weather conditions. Although the C. P. R. are now moving twelve miles of loaded cars per day, the closing of lake navigation tends to make the storage and transportation problems ever present sources of anxiety to our farmers.

The war, while a devastating agent in many respects, has opened the way for a great future for this country. Many lines of industry previously little known in our midst, have developed remarkable proportions. The inability to secure much-needed chemicals (formally imported from Austria and Germany) has given great impetus to their local manufacture, and many plants have been erected and are now working to capacity supplying what a few years ago was deemed impossible.

Public opinion is being and will continue to be educated along stimulating

and constructive lines, and with the coming years there are bound to come further unheard-of developments in Canada's industrial position.

## Pig Iron

Production of pig iron is being maintained as fast as our blast furnaces can reduce the ore. Further price advances are, of course, expected.

## Steel

The abnormal conditions at present prevailing in the steel situation show little variation from the previous week. Contemplated placing of further orders for British, French and Russian shells will not only add activity to the steel producing industries, but will also increase the difficulty of securing an ample supply of steel.

The probability of a shortage in the steel supply is being discussed, and probabilities are that a few plants may be

### CANADIAN GOVERNMENT PURCHASING COMMISSION

The following gentlemen constitute the Commission appointed to make all purchases under the Dominion \$100,000,000 war appropriation:—George F. Galt, Winnipeg; Hormidas Laporte, Montreal; A. E. Kemp, Toronto. Thomas Hilliard is secretary, and the commission headquarters are at Ottawa.

temporarily shut down. Domestic requirements have been greatly affected by the present European situation. For many years the Krupp works in Germany have supplied certain brands of steel in this connection, but with the opening of hostilities this source of supply was suddenly cut off. The manufacture of these particular grades of steel had been given little attention on this continent. The past year has, however, shown great developments in the production of steels previously made in foreign countries, with the result that today this grade of steel has not only been duplicated, but the possibilities are that the improvement will exceed the highest expectations of its producers. Thus, it may be said that, although the war has had terrible results in many ways, the necessity of the times has forced the American and Canadian manufacturers to develop resources that have until now been lying dormant.

Boiler plates have shown strength during the week, and are now quoted at \$2.75; heads, 30 inches and over, \$2.80; and tank plates, \$3.

Sheets are holding firm, with an advance likely in the near future.

## Machine Tools and Supplies

Domestic requirements are commencing to add increased pressure to those of the war for machines and equipment. Some machine tool builders, who contemplate making additions to their plants, are uncertain of being able to secure the necessary help to operate same. While this might be true in some localities, the general impression, however, is that sufficient help will be available to maintain any increased output required.

Automobile makers are continually adding to their equipment, and much increased production along these lines is looked for this winter and during the spring of 1916.

The continued demand for supplies to maintain shell production is keeping the prices of these commodities firm and steady. The heavy demand for high-speed steel continues and quotations of \$2.50 upwards are still in force. Prices on all supplies are holding firm.

## Metals

The general condition of the metal market shows little change, with the exception of copper and tin. The former, due to increased domestic demand, has advanced, while the latter has dropped below last week's price.

**Copper.**—The strength of the market this week is due to the increased demand for domestic purposes. However, if the war requirements have a tendency to force the price much higher, the domestic demand may be somewhat curtailed, as the increase in price will undoubtedly effect the consumption for ordinary purposes. The mine production at the present time is large, but this could possibly be increased about 5 per cent. The probability of continued war demands will likely call for a further advance. With the increase noted this week, the quotation on lake copper, carload, is \$21.50 per 100 pounds.

**Tin.**—Both buyers and sellers are showing little interest in spot or future deliveries, and the market is dull and inactive. Present quotation of \$46 shows a decline of \$2 over the previous week.

**Spelter.**—Despite foreign firmness in spelter, the local market is quiet. However, the prices are holding steady, and no advance falls to be registered. The consumption is not exceeding the supply, and no price change is expected. The market is steady at \$20.

**Lead.**—The demand at present is not heavy, and the market is not active. The quotation of \$6.75 prevails.



**Aluminum.**—No change is shown in aluminum, and the market is firm at 62¢ per pound.

**Antimony.**—This is firm, 42¢ being quoted.

#### Old Materials

The remarkable activity in the scrap metal market during the past week has created much excitement among dealers. Trading in old material of every description is general, and prices have advanced in every direction. While heavy melting steel scrap has shown no advance, the possibilities are that future quotations will show an increase. The stiffening of all grades of scrap is a feature of this week's business.

**Toronto, Ont., Nov. 30.**—An interesting development affecting the steel industry is the announcement that plans are being worked out for extending the scope of the Munitions Committee to include the distribution of orders for shells from all the Allies. Another interesting feature is a proposal for Canadian banks to assist factories in financing orders for shells. An arrangement such as this will permit of larger orders being handled and greatly simplify the financial aspect of the business. Hitherto all payments have been made in British funds. No very definite information is available with regard to the 8-in. and 9.2-in. shells, but it is understood that orders for 60-pdr. and 6-in. shells are being placed first.

The reorganization of the Shell Committee has been completed and the new body will be known as the Imperial Munitions Board. J. W. Flavell of this city has been appointed chairman, and General Alex. Bertram deputy-chairman. A Commission has been appointed to enquire into the supply of raw materials for the production of munitions. Col. Thomas Cantley will be Chairman of the Commission.

Industrial conditions continue to steadily improve and a more optimistic feeling prevails in business circles with regard to the outlook for the future. Money is circulating more freely, railway earnings are increasing, and the volume of business is growing notwithstanding a steady advance in prices on many lines. The volume of exports is also increasing each month, thus improving the financial condition of the country.

#### Steel Market

The market continues very active and prices are holding very firm with a decided upward tendency. The demand for steel, particularly for shells, is on the increase, and mills are getting behind on deliveries, notwithstanding plant extensions which have been made to cope with the business. Steel bars are firm at 2.75¢ and iron bars are unchanged at 2.50¢, but an advance is looked for in

the near future. Wire nails have advanced again and are now quoted at \$2.75 base, per keg. Boiler plates and lapwelded boiler tubes are higher. A new list for bolts and nuts has been issued, the prices showing a slight increase over the previous list. A new discount of 25 per cent. for cold drawn steel shafting is announced. Prices of proof coil chain and electric weld chain have been revised. The new discount on iron rivets 7-16-in. and less is 67½ per cent., and copper wire is now 30 per cent. off list. Smooth steel wire has advanced and is now quoted at \$2.85 base.

The galvanized sheet market is extremely irregular. There is an increasing scarcity of steel and black sheets are therefore rising in price. Spelter is being maintained at a level too high to be attractive to the makers of galvanized sheets; in addition there is a shortage

have reached a danger point and any further advances should be prevented if possible. There is little indication, however, that prices have reached the top level. It is reported from London that the Allies can now manufacture all the munitions they require. Even if this is the case they will still need steel, as the output of steel has not increased in the same proportion as munitions. Heavy tonnages of steel will be required for other purposes. Prices continue to advance in many steel products: steel bars, however, are unchanged at 1.70¢. Beams are higher at 1.70¢, Bessemer billets \$28, open-hearth billets \$29, and forging billets \$50 base, Pittsburgh. Prices of billets are nominal owing to the shortage in Bessemer and open-hearth steel.

#### Pig Iron

The market is very active and prices of domestic brands of pig iron have again been advanced; Hamilton and Victoria brands are \$1.25 higher than last week and are now quoted at \$23 ton. Grey forge, Pittsburgh, has advanced and is quoted at \$16.45. There is a heavy demand for steel-making grades of iron, but foundry iron is less active.

#### Old Materials

Conditions in the market for old materials are much the same as last week and prices are practically unchanged, although firmer for some scraps. Copper and zinc scrap are both very firm and have a higher tendency. Heavy melting steel is strong but No. 1 wrought iron is weaker, and is now quoted at \$9. Copper and heavy melting steel are in good demand but other lines are quiet.

#### Machine Tools

Business has been fairly good in machine tools this week but it is expected that there will be heavier demand later when the large orders contemplated are placed. A number of orders for machinery for the 6-in. and 60-pdr. shells have been booked, but nothing has been done as yet with regard to equipment for the large shells. There is a good demand for second-hand tools, but these are getting somewhat scarce. Prices are still high and deliveries do not show much improvement. An interesting development in the trade of recent date is the taking over of the Russell Motor Car plant by the Willys-Overland Co. It is stated that extensions will be made to increase the output.

#### Supplies

An advance of 2¢ per gallon for gasoline and benzine are the only price changes to note this week. There is a great scarcity of gasoline on account of heavy shipments from the States to Europe owing to some of the larger fields being in enemy countries. Turpen-

#### ALLIES PURCHASING AGENTS

The Trade and Commerce Department, Ottawa, has published the following list of purchasing agents for military purposes for the allied Governments:

**International Purchasing Commission, India House, Kingsway, London, Eng.**

**French.**—Hudson Bay Co., 56 McGill Street, Montreal; Captain Lafoulloux, Hotel Brevort, New York; Direction de l'Intendence Ministere de la Guerre, Bordeaux, France; M. De la Chaume, 28 Broadway, Westminster, London.

**Russian.**—Messrs. S. Ruperti and Alexsief, care Military Attache, Russian Embassy, Washington, D.C.

of sulphuric acid. This combination of circumstances is affecting the market and prices of sheets cannot help but advance. "Apollo," 103½ oz., are now quoted at \$5.75, and "Premier" No. 28, at \$5.50. In some cases, sellers have done away with the regular differentials and are basing prices for each gauge on its cost. Some mills are said to be refusing to quote on galvanized sheets on account of operations having been cut down due to the acid and spelter situations. Black sheets are quoted at 2.40¢ to 2.75¢ Pittsburgh, and blue annealed 2.10¢ to 2.25¢ Pittsburgh.

In the States there is no cessation in the demand, which on nearly all lines of steel products, is beyond the capacity of the mills to supply. The majority of steel companies have sold their output for the first quarter of 1916 and have enquiries extending into the second quarter. Some authorities believe that prices

line is very firm, and may go higher. Lardseed oil is unchanged, but prices are irregular. Business continues very active with a good demand for most lines. Prices on high-speed twist drills are still withdrawn.

#### Metals

The situation in the metal market shows no appreciable change from last week. Copper continues strong and has advanced slightly. The tin market has reacted and is lower, following a decline in London. The spelter market is quiet and unchanged. Zinc ore is very high, being quoted \$100 to \$115 at Joplin, Mo. The lead market is very strong both in London and New York. The antimony market is strong and scarcity of supplies is being felt. Aluminum is also scarce and quotations are nominal.

**Tin.**—The market is dull and featureless with prices lower. There continues to be little interest shown by buyers for any deliveries, at the same time sellers are inclined to be indifferent. Tin has declined 2c and is being quoted at 46c per pound.

**Copper.**—The market is strong and higher and the position of copper is a decidedly strong one. Consumption is increasing and is, if anything, in excess of the current output. Lake copper is now quoted at 20¾c and electrolytic at 20½c per pound.

**Spelter.**—The market advanced in London, but this did not stimulate the New York market. The situation is practically unchanged and indications point to higher prices rather than otherwise. Spelter is unchanged at 21c per pound.

**Lead.**—Both London and New York markets are very strong. The "Trust" price of 5.25c New York is being firmly held with a possibility of an advance. Lead is unchanged locally at 7c per pound.

**Antimony.** The market is in a stronger position than it has been and is feeling the full effects of the scarcity of supplies. Quotations locally are firm but unchanged at 40c per pound.

**Aluminum.**—There is no improvement in the situation with regard to supplies, which are very difficult to obtain. Quotations are nominal at 65c per pound.

### IMPERIAL MUNITIONS BOARD CONSTITUTED

ADVICES from Ottawa give particulars of the constitution of what will in future be known as "The Imperial Munitions Board." This body displaces the Dominion Shell Committee in the management and distribution of contracts for the various munitions requirements of the Imperial Government. The reconstructed board has at its head J. W. Flavelle, of Toronto, who will act as chairman, with executive and adminis-

trative powers. Brig-Gen. Bertram, former head of the Shell Committee, will in future hold the position of deputy chairman, with the following others comprising the board:—Hon. Col. David Carnegie (member of the Shell Committee), G. H. Dawson, C. B. Gordon, J. A. Vaillancourt and E. R. Wood, the latter four being new members.

The new chairman is head of the William Davies Packing Co., and was appointed a member of the recently-formed Dominion Economic Commission. Mr. Gordon is head of the Dominion Textile Co. Mr. Vaillancourt is president of the Bank of Hochelaga. Mr. Dawson is now a resident of Victoria, B.C. Mr. Wood is a well-known Toronto financier, and is closely connected with the Mackenzie & Mann interests. Mr. Gordon is a well-known Montreal manufacturer. Sir Sam Hughes becomes honorary president of the board.

#### Commission on Raw Materials

In addition to the forming of the above new board, a commission has been established to make inquiry into the supply and sufficiency of raw materials in Canada required for the production of munitions of war, and as to the best methods of conserving same. The following are the members of this new commission: Col. Thomas Cantley, head of the Nova Scotia Steel & Coal Co., New Glasgow; E. Carnegie, Welland; Geo. W. Watts, Toronto; Robert Hobson, Hamilton; Senator William C. Edwards, Ottawa, and Geo. G. Mackenzie, B.Sc., Superintendent of Mines, Ottawa. Messrs. Cantley, Carnegie and Watts were members of the original Shell Committee.

### N. T. R. TRANSCONA SHOPS TO MAKE MUNITIONS

IT is reported that the Government has leased the Transcona shops, near Winnipeg, of the N. T. R., to a powerful private company, organized for the manufacturing of shells and war munitions generally. These shops, which are part of the equipment of the National Transcontinental Railway, and which were erected and fitted with the most modern machinery procurable, are well adapted for the manufacture of shells, but have been practically idle since the war broke out.

The personnel of the company has not been definitely learned. It is known that the Mackenzie & Mann interests have been negotiating for some time for a lease of the shops for the purpose mentioned, but whether that company has secured the lease or not is not learned. A rumor to the effect that Sir Herbert Holt, of Montreal, and a group of other financial men have secured the lease is current.

The Government has had a splendid

opportunity of contributing toward the shell supply of the allied armies at reasonable prices by the utilization of both the Transcona and Leonard shops, but both of these institutions have been left practically idle while companies have been formed all over the Dominion and new plants established for the manufacture by private individuals of shells at large profits.

It is understood that the men now employed in the Transcona shops have been notified that after a certain named date they were to look to the new company for their salaries, and not to the Government. Only a portion of the shops will be retained by the Government for the ordinary work of railway rolling stock repairs.

### SHELL ORDERS FOR ALLIES

THE scope of the Canadian Shell Committee, or the Imperial Munitions Board as it is now called, may be enlarged before long to include the placing of orders for both the French and the Russian Governments.

Thus far the committee has had charge of the placing of munition orders in Canada for the Imperial authorities only. British orders have had the preference all along with Canadian manufacturers, for obvious reasons.

The shell making capacity in Canada, however, has now increased to a point that will probably permit of Canadians assisting in the manufacture of munitions for both the French and the Russian Governments on a fairly large scale, and in well-informed circles it is stated that proposals looking towards the extension of the Munitions Committee's activities are now actively under consideration.

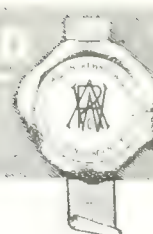
If the proposals are carried out, an important feature will be the unification of the work. Instead of individual firms going after orders which they understand are under negotiation, the Munitions Committee will be able to act as a central bureau, bringing the Russian and French authorities into touch with the manufacturers. This will permit of business on a much larger scale than could be attempted if individual effort were depended upon, and the results should be satisfactory to both the Allied Governments and the Canadian manufacturers.

**Major George Janin**, city engineer of Montreal, who commanded a corps of engineers which he raised himself for war service, was drowned when the hospital ship *Anglia* sank after striking a mine. Major Janin was born in Paris, and saw service in the Franco-Prussian war. He was city engineer for twenty years.





**THE A.R. WILLIAMS MACHINERY CO. LTD.**  
ST. JOHN, N.B. TORONTO WINNIPEG VANCOUVER  
*Canada's Leading Machinery House*



# The Hepburn Single Purpose Heavy Duty Shell Turning Lathe (Patents Applied For)

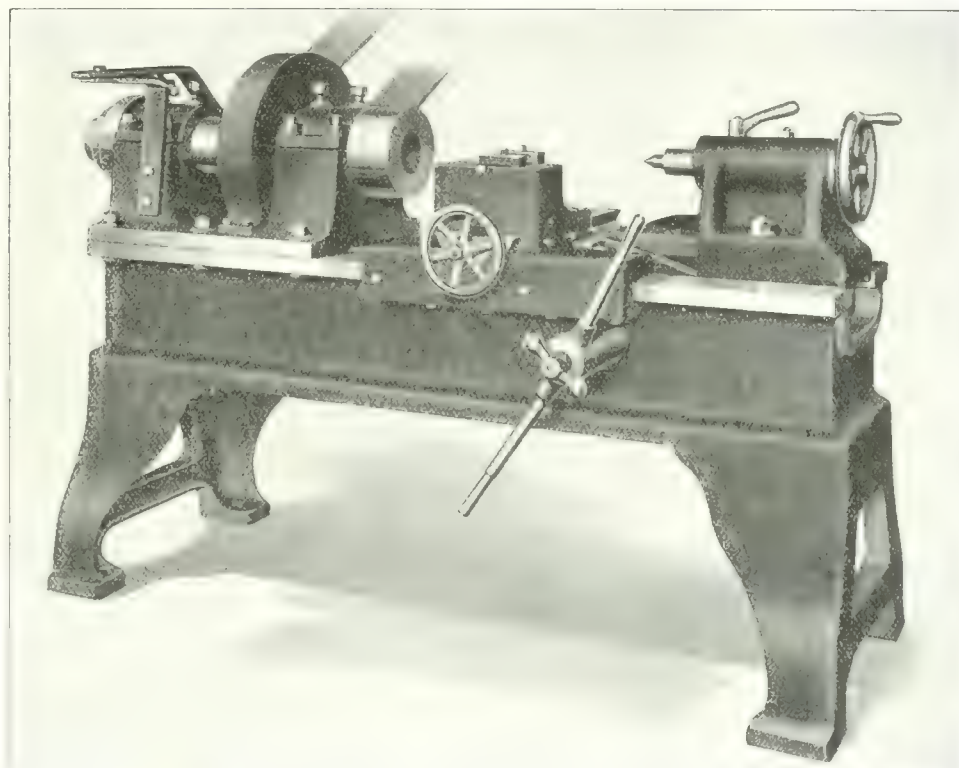
*Speed*

*Accuracy*

*Power*

*Strength*

*Simplicity*



## SPECIFICATIONS

Diameter of Spindle, front bearing ... 6 1/2" x 7 1/2"  
Diameter of Spindle, back bearing ... 5 1/4" x 7 1/2"  
Hole through Spindle ... 3 1/2"  
Ball thrust on front of front bearing of spindle ... 18"  
Swing over Bed ... 6 feet 6 in. long by 1 foot 7 1/2" wide, flatways,  
giving 5 1/2 in. bearings on each side.

Ratio of Gearing 5 to 1.  
Travel of Tailstock Spindle ... 8"  
Three Feed Speeds ... 1, 32, 1, 16 and 1/8  
Cast Friction Drive Pulley, 14 1/2" diam. and 8"  
face for driving from line shaft.  
Will supply countershaft and tight pulley on lathe  
if desired.

The quality and service idea was built right into this lathe, which is assurance of your getting long and efficient use out of it.

Get your order in and take advantage of prompt deliveries now available.

Our endorsement is backed by nearly 50 years' selling experience.

## The A. R. Williams Machinery Co.

LIMITED

64-66 Front Street W. - TORONTO, CANADA  
ST. JOHN, N. B. WINNIPEG VANCOUVER

IF IT'S MACHINERY—WRITE "WILLIAMS"

*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*

# INDUSTRIAL AND CONSTRUCTION NEWS

Establishment or Enlargement of Factories, Mills, Power Plants, Etc.; Construction of Railways, Bridges, Etc.; Municipal Undertakings; Mining News.

## Engineering

**Toronto, Ont.**—A new boiler will be installed at the municipal abattoir.

**Petrolia, Ont.**—Fred Howlett will build a brick and tile manufacturing plant.

**Renfrew, Ont.**—The Energite Explosives Co., of Montreal, Que., are building a plant here.

**West Lorne, Ont.**—The West Lorne Motors, Ltd., will shortly be in the market for new machinery.

**Port Arthur, Ont.**—It is reported that the Atikokan Iron Co. will equip part of their plant for making munitions.

**London, Ont.**—The Spray Motor Co. plans to purchase machinery for the manufacture of shells and other munitions.

**Toronto, Ont.**—Colonel Caldwell has informed Mayor Church that two of the boilers in the old General Hospital where the troops are stationed will have to be renewed.

**Port Hope, Ont.**—The Standard Ideal Co. have received from the Munitions Committee an order for 60-pdr. high explosive shells, worth over a quarter of a million dollars.

**Parry Sound, Ont.**—The Canadian Explosives, Ltd., will proceed at once to rebuild the section of their plant at Nobel, near here, which was recently damaged by an explosion.

**Windsor, Ont.**—The Ontario Cartridge Co., which is being organized, will take over the property formerly occupied by the Steel Products Co. and install machinery for making cartridges.

**Collingwood, Ont.**—Arrangements are being made to put the plant of the Northern Steel Co. in good repair for the manufacture of steel blanks for shells. Frank B. Baird, of Buffalo, N.Y., has concluded a satisfactory agreement with the Town Council with regard to tax assessment. The plant will be under the immediate control of William Kennedy & Sons, Owen Sound, Ont.

## Electrical

**Exeter, Ont.**—A transformer station will be built here at a cost of \$5,000.

**Ridgetown, Ont.**—The hydro distribution system is nearly completed, and it is expected that power will be turned on shortly.

**Milverton, Ont.**—It is expected that hydro will be duly installed and ready for service by Christmas. A site has been purchased west of the town for the power station.

**Peterborough, Ont.**—The Dickson Co. has offered the city electrical energy for the hydro-electric system at \$16 per horse-power delivered here, or \$13 delivered at Lakefield, where the company can develop 30,000 horse-power when the new Government dam is completed. It is stated that the Ontario Power Commission approves the price.

## Municipal

**Chatham, Ont.**—The city council have decided to submit the Dominion Sugar Co.'s by-law on Jan. 3.

**Kingston, Ont.**—The city council are in the market for 500 feet of fire hose for the civic buildings.

**Princeville, Ont.**—The town council are considering the installation of pumps, cast iron pipe and hydrants.

**Stratford, Ont.**—A new water-main 1,000 feet long will probably be installed on Wellington and Britannia streets.

**Galt, Ont.**—The city council have agreed to permit the Galt Machine Screw Co. to build on the proposed site at Jackson Park.

**Sarnia, Ont.**—Sarnia City Council have decided to submit a by-law calling for the expenditure of \$12,000 on the extension of the water-mains.

**Cornwall, Ont.**—A by-law will be voted on by the ratepayers on Jan. 1 to authorize an expenditure of \$25,000 on waterworks extensions and pumping equipment.

**The Pas, Man.**—The town council contemplate spending \$80,000 on a sewerage and waterworks system and \$50,000 on the construction and equipment of an electric light system.

**Newcastle, N.B.**—D. A. Jackson, electrical engineer, in a report to the town council recommends the installation of a

motor-driven centrifugal pump with a capacity of 350 Imperial gallons per minute. The cost of pump and motor is estimated at \$2,000.

**Swift Current, Sask.**—A motion was unanimously passed at a council meeting recently that the city agents engage a competent engineer to make a thorough examination of the pumping and waterworks system and advise as to what will be required to bring these utilities up to adequate standard and make for a thoroughly efficient system.

## General Industrial

**Port Dover, Ont.**—Port Dover Canning Co. will probably erect a new factory at an estimated cost of \$10,000. W. Carson is the manager.

**Millerton, N.B.**—The New Brunswick Paper and Pulp Co. mill which was recently destroyed by fire will be rebuilt by an Anglo-American concern of which Sir Robert Perks is the main stockholder.

## Building Notes

**Powassan, Ont.**—Contracts have been let for improvements to the Town Hall, to cost \$2,710.

**Long Branch, Ont.**—The big new \$36,000 public school is now fairly under way, excavation work going on. The building will cost \$26,000, and \$10,000 will be spent on the site, which covers more than two acres.

**Toronto, Ont.**—The Salvation Army have received a building permit for the erection of a three-storey brick and stone training home, costing \$90,000, on the north side of Davisville Avenue, near Yonge Street.

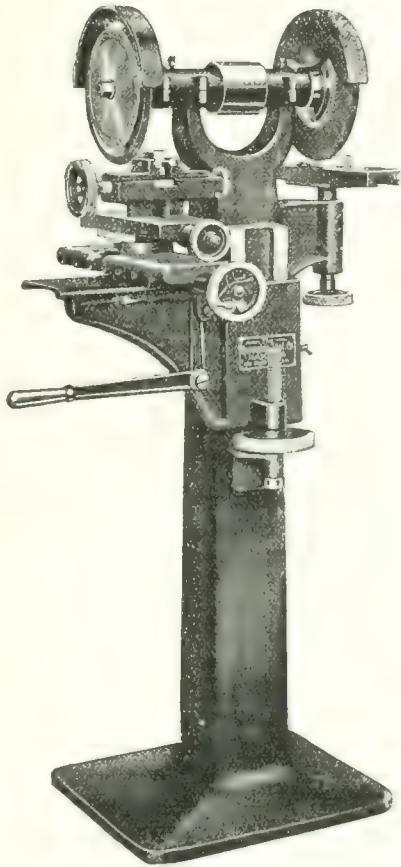
## Wood-Working

**Rainy River, Ont.**—A new industry will be established here for making boxes and shingles, etc.

**Acton, Ont.**—D. A. Henderson will rebuild his sawmill, which was recently destroyed by fire. Loss, \$4,000.

**Revelstoke, B.C.**—D. W. Abrahamson's sash and door factory was destroyed by fire recently. The loss is estimated at \$20,000.





## NO SCREW CUTTING TOOL CAN BE SUCCESSFULLY OPERATED

Without Proper Grinding or Sharpening.

## THE GEOMETRIC CHASER OR DIE GRINDER

is a machine carefully designed and constructed for the correct grinding of thread chasers and dies.

Its use is economy where threading tools are employed.

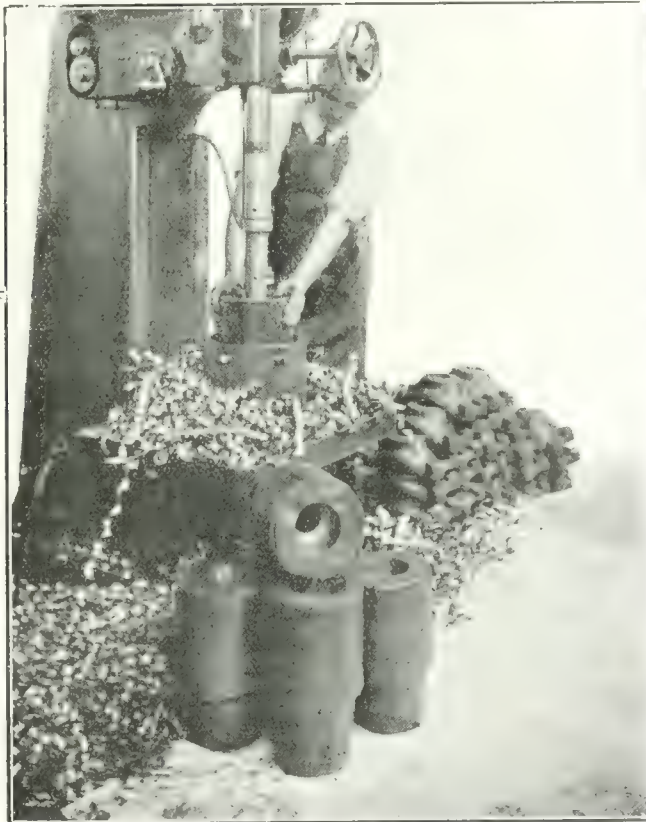
It not only keeps all the chasers of a set in condition for perfect work, but at the same time prevents excessive wear on one or two of the chasers.

THE GEOMETRIC grinds any make of thread chaser, whether of a stock or special type. Also fitted with a second grinding wheel for ordinary tool grinding.

SEND FOR DESCRIPTIVE BOOKLET

**The GEOMETRIC TOOL COMPANY**  
NEW HAVEN, CONN., U. S. A.

CANADIAN AGENTS: Williams & Wilson, Limited, Montreal.  
The A. R. Williams Machinery Co., Limited, Toronto, Winnipeg, St. John, N. B.



**No. 314 Heavy Pattern High-Speed Drill**

**IT'S A BAKER**

**Enlarging 2½" hole to 4" in  
hammered steel forgings at  
the rate of 4" feed per minute**

THIS DRILL PRESS HAS AMPLE CAPACITY TO DRIVE 3-INCH, HIGH-SPEED DRILLS TO THE LIMIT OF THEIR EFFICIENCY IN STEEL. IT WILL BORE WITH GREAT EFFICIENCY IN STEEL OR CAST IRON UP TO 6 INS.

A rigid, rapid, powerful machine, driven by positive, fast-running gears immersed in oil. Eight speed and twelve feed changes within easy control of the operator.

BAKER DRILLS ARE POPULAR TOOLS ON LYDDITE AND SHRAPNEL because they produce accurate and dependable work at extremely low labor cost, low installation cost and they take small floor space.

May we furnish more reasons why you need them?

**BAKER BROTHERS**  
TOLEDO, OHIO, U. S. A.

Sales Agents: The A. R. Williams Machinery Company, Limited, Toronto, Canada

*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*

**Collingwood, Ont.**—Wilson Bros. are asking for a loan of \$35,000 from the Town Council for the purpose of extending their planing mill and developing their business. H. A. Currie is president of the company.

## Tenders

**St. Hyacinthe, Que.**—Tenders will be received up to January 11, for a mechanical filter plant. Plans and specifications may be obtained at the office of Hector Cadieux, city engineer.

**Halifax, N.S.**—Tenders will be received by the Governor of the Province of Macao, up till January 8, 1916, for the supply of a steel, self-propelling dredge for the use of the Macao Harbor Works. Full particulars may be obtained at the office of Fred H. Oxley, Consul for Portugal, Keith Bldg., Halifax, N.S.

**Toronto, Ont.**—Tenders only for all trades required in connection with the erection of a public lavatory on Keele street will be received up to Tuesday, December 7, 1915. Plans and specifications may be seen and forms of tender and all information obtained at the office of the City Architect, City Hall, Toronto.

**Halifax, N.S.**—Tenders will be received by the Governor of the Province of Macao, up till January 8, 1916, for the supply of a steel, self-propelling dredge for the use of the Macao Harbor Works. Full particulars may be obtained at the office of Fred H. Oxley, Consul for Portugal, Keith Bldg., Halifax, N.S.

**St. Hyacinthe, Que.**—The city council will receive tenders until January 11 for excavation, concrete work, superstructure and mechanical equipment required in the construction of a filtration plant with a capacity of 3,000,000 gallons a day. Plans and specifications can be obtained from the engineer, H. Cadieux. Estimated cost, \$75,000.

**Toronto, Ont.**—Tenders for temporary postal station "A," Toronto, Ont., will be received until Dec. 9, 1915. Plans, specifications and form of contract can be seen and forms of tender obtained at the office of Mr. Thos. A. Hastings, Clerk of Works, Postal Station "F," Yonge Street, Toronto, Ont., and at the Department of Public Works, Ottawa.

**Winnipeg, Man.**—Tenders addressed to the Commissioners of the Greater Winnipeg Water District will be received up to December 15, 1915, for the supply of miscellaneous bronze castings, brass piping, etc., which enter into the construction of a Venturi meter. Specifica-

tions and form of tender may be obtained at the office of the District, 901 Boyd Bldg., Winnipeg.

**Toronto, Ont.**—Tenders will be received by the Chairman, Board of Control, City Hall, up to Tuesday, December 7, 1915, for the supply and erection of a mechanical mixing apparatus for the high-level chlorination plant, Wilton avenue and Don River; also the supply and erection of a mechanical mixing apparatus for the low-level chlorination plant, Eastern avenue and Don River. Specifications and forms of tender may be obtained at the Works Department, Room 6, City Hall.

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## Contracts Awarded

**New Westminster, B.C.**—The City Council has awarded a contract to Vulcan Iron Works, for riveted steel pipe, at \$7,000.

**Sherbrooke, Que.**—The City Council have awarded the contract for gas holders for the new gas works to the Jenkes Machine Co., of this city.

**Berlin, Ont.**—The City Council have awarded contracts for valves to the Kerr Engine Co., Walkerville, Ont., and cast iron pipe to the Gartshore-Thompson Co., Hamilton, Ont.

**Stratford, Ont.**—At the meeting of the Public Utilities Commission on Nov. 22, the contract for the installation of the foundation for the new water tower was let to Everett & Marston, of this city.

## Trade Gossip

**Vancouver, B.C.**—The Eclipse Iron Works has been incorporated for \$20,000 to do a general iron manufacturing business.

**The Canada Nut Co., Vancouver, B.C.**, has been incorporated with a capital stock of \$60,000 to manufacture bolts, nuts, etc.

**Quebec, Que.**—The new power-house under course of construction at the

Transeontinental car shops at St. Malo is nearing completion.

**Wallaceburg, Ont.**—It is reported that the oil refinery will commence refining about April 1 under a reorganized company. The owners, R. G. Stitt, of Toledo, and C. W. Yates, of New York, were here this week.

**Owen Sound, Ont.**—The Corbett Foundry and Machine Co. have secured contracts for engine lathes and thread millers, both of which are used in the manufacture of shrapnel and high-explosive shells.

**Ottawa, Ont.**—Ten million dollars is the capital stock of the British-Canadian Steamship Co., which has been incorporated here this week, with Montreal head office. It has secured wide powers incidental to the carrying on of a general steamship business.

**The Barrie Carriage Co., Barrie, Ont.**, have completed arrangements with the Bell Motor Car Co., of York, Pa., and will manufacture and sell this car in Canada. The present plant will be utilized and the new department will be equipped with as little delay as possible.

**The Monarch Machine Tool Co., Hamilton, Ont.**, have equipped a plant to manufacture lathes, thread millers, cutting-off machines, special tools and machinery for shell-making purposes. Wm. Garlock, Jr., 197 Wellesley street, Toronto, will have charge of the sales and service departments.

**School of Navigation.**—The second session of the School of Navigation at Queen's University, Kingston, Ont., is to open on December 14th, and continue for three months. The school will be in charge of Capt. H. M. McMaster, assistant superintendent of the Montreal Transportation Co.

**Edmonds, B.C.**—At a meeting of the Burnaby Board of Trade, held on Nov. 17, W. H. Mansfield, the secretary, delivered an address, advocating the wisdom and necessity of at once taking steps to push Burnaby's claims and advantages for industries. The city has a population of nearly 17,000.

**Armstrong Bros. Tool Co., Chicago, Ill.**, announce that they have been awarded the Grand Prize for tool-holders at the Panama-Pacific Exposition at San Francisco. They were also awarded a medal of honor on other Armstrong products exhibited, including ratchets, drop-forged wrenches, clamps, lathe dogs, etc.

**Brockville, Ont.**—The Canadian Briscoe Motor Co., who have taken over the Dominion Carriage Co.'s factory, will extend the plant. The company is capital-



## A Sensible Suggestion For You

With Christmas but three weeks away, our thoughts naturally turn to the time-honored custom of giving gifts of remembrance to our friends.

It has been a year of serious thinking, and the thoughts of the nation will be reflected in its Christmas giving. The useful gift will be the most acceptable and the most appreciated.

Let us suggest something that, considering its real value, will prove comparatively inexpensive.

Something that will constantly remind the recipient of your thoughtfulness.

Something that will prove a neat compliment to the one receiving it, that you considered him capable of appreciating a gift of this character.



At the direction of

you have been entered upon our subscription list  
to receive

for one year.

It is our hope that each copy you receive may serve  
as a pleasant reminder of the one who sends you  
this holiday remembrance.

The MacLean Publishing Co., Limited, Toronto.

### *Let Us Suggest Canadian Machinery*

Give CANADIAN MACHINERY to your employees and to your friends this Christmas.

It is only \$2.00 for 52 issues, yet throughout the year its value will be magnified as its usefulness becomes more fully appreciated.

Send us the list of names and addresses, and we will send a handsome three-colored announcement card, a small reproduction of which is shown. This, together with the first copy of CANADIAN MACHINERY, will reach the recipient on Christmas Day. *Try it this year!*

# CANADIAN MACHINERY

143 University Avenue, Toronto, Ontario, Canada



## PATENTS PROMPTLY SECURED

In 40 countries. Ask for our Inventor's Adviser, which will be sent free.

**MARION & MARION, 364 University St.**

Merchants Bank Building, corner St. Catherine St., MONTREAL, Phone Up. 6474 and Washington, D.C., U.S.A.

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FETHERSTONHAUGH & CO.  
THE OLD ESTABLISHED FIRM  
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ROYAL BANK BLDG. TORONTO  
SEND FOR PLAIN PRACTICAL POINTERS  
COPY NATIONAL PROGRESS IN WHICH  
ALL OUR PATENTS ARE ADVERTISED

# "HAWK" D CHROME VANADIUM STEEL



Will  
Give You  
Exceptional

## Shell Forging Production

WITHOUT AN EQUAL FOR  
BOTH FIRST AND  
SECOND OPERATION  
PUNCHES.

Comes to you heat treated  
and ready for use.  
It does not stick to the  
work.

There are many cases where  
each punch has turned out  
over 2,000 shells.

It means more shells, per  
machine per day.

STEEL OF EVERY  
DESCRIPTION.

## Hawkrige Brothers Company

303 Congress St., BOSTON, MASS

ized at \$200,000 and the following officers have been appointed: T. J. Storey, president; D. M. Spaidal, vice-president; W. G. Jarman, secretary-treasurer, and and general manager; Ellery Wright, mechanical superintendent.

**Vancouver, B.C.**—Application is to be made by the Burrard Inlet Tunnel & Bridge Co., through their Parliamentary representatives at Ottawa, Messrs. Pringle & Guthrie, for an extension of the company's charter, which expires on the 3rd of April, next year. Owing to lack of finances, the company finds that they are unable to proceed now with the construction of the Second Narrows Bridge or the other work covered by the company's charter. Consequently an extension of time, probably five years, will be asked for.

**Windsor, Ont.**—A federal charter has been granted to the Pilcher Manufacturing Co., a new industry in this city. The incorporators are John Vashe Pilcher and George Pegram Walton, manufacturers, Henry Septimus Gray, capitalist, and Charles Lee Hamilton, merchant, of the city of Louisville, Kentucky; and Thomas Porter Archer, of the city of Windsor. The capital stock is \$550,000.

**Toronto, Ont.**—Sir Adam Beck wants the city to submit a by-law to the people on January 1, authorizing an expenditure of \$3,000,000 for Hydro radials. The Chairman of the Provincial Hydro Commission declared: "We are up to Toronto on the east with the vote on these radials and we are now coming after them on the west. We can do nothing else until Toronto moves, and I think that the by-law authorizing an expenditure of \$3,000,000 for Hydro radials should be submitted as soon as possible." Sir Adam explained that it did not necessarily mean the immediate expenditure of \$3,000,000, but the feelings of the people should be sounded, so that their position could be understood.

**Toronto Transportation Club** held their annual dinner at the Carls-Rite Hotel last Monday evening. The following officers were elected for the ensuing year: President, M. G. Murphy, C.P.R.; Vice-Presidents: Thos. Marshall, Board of Trade; C. E. Horning, D.P.A., G.T.R.; Secretary, W. A. Gray, D.L. & W. Ry; Treasurer, Murdo Macdonald, Grand Trunk Railway; Executive: John Gray, M. H. Brown, B. H. Bennett, D. O. Wood, John Jolly, W. J. Moffat, H. E. Watkins, W. Fulton, J. Stewart, C. B. Brodie, John Thomson. Committee Chairmen: Entertainment, F. V. Higginbottom, C.N.R.; Membership, W. Melroy, C.P.R.; Sick, John M. Copeland, Chicago & North Western Railway.

Hydro Development is Being Advanced. Progress is being made by Sir

## MORTON MANUFACTURING CO.

PORTABLE PLANERS  
DRAW CUT SHAPERS  
SPECIAL DRAW CUT R R SHAPERS  
FINISHED MACHINE KEYS  
STATIONARY & PORTABLE KEY WAY CUTTERS  
SPECIAL LOCOMOTIVE CYLINDER PLANERS  
OFFICE AND WORKS: MUSKEGON HEIGHTS, U.S.A.

## DENNISTEEL

LONDON - CANADA  
THE BEST STEEL LOCKERS MADE IN CANADA  
MADE BY  
THE BEARDS WIRE AND IRON WORKS CO. LIMITED  
LONDON, CANADA

# SHEET METAL STAMPINGS

## Automobile Fenders, Hoods and Gasoline Tanks

We are now manufacturing  
a number of lines for Canadian  
firms filling war contracts.

The quality of our production  
is one grade — THE  
BEST. Our facilities and  
equipment enable us to  
give a very attractive price  
and prompt service.

THE  
Dominion Forge &  
Stamping Co.

LIMITED

Walkerville, Ont.

# DROP FORGINGS



# FIRE BRICK

For  
Heat-Treating  
Furnaces, etc.

USING ELK FIRE BRICK IN LINING HEAT-TREATING FURNACES IS ANOTHER WAY OF ADDING TO THEIR EFFICIENCY, ECONOMY AND DURABILITY.

We carry in stock a large variety of shapes and sizes.

Write for catalog.

We can fill all orders promptly.

The Elk Fire  
Brick Co. of  
Canada, Ltd.

Federal Life  
Building,  
Hamilton,  
Ontario



## Tungsten High-Speed Steel

We have good quantities in our New York Stock, and can also make Tonnage Delivery from January forward of our Rushitoff No. 6 and No. 7.

**Orders must be to hand  
before Dec. 15.**

We also have complete stocks of Nickel, Chrome Nickel, Chrome Vanadium, and Tool Steels.

## Fairley Davidson Steel Co.

MAIN OFFICE AND WAREHOUSE:

124 Maiden Lane - NEW YORK

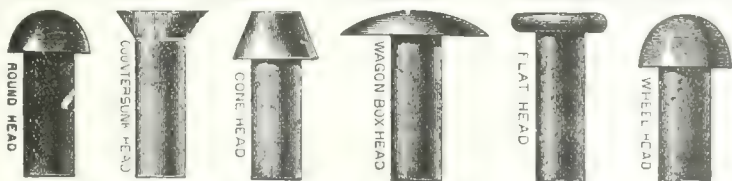
Cable Address: "Art Davidson."

## AUTOMATIC WOOD SCREW MACHINES

Cable Address:  
Cook, Hartford, U.S.A.

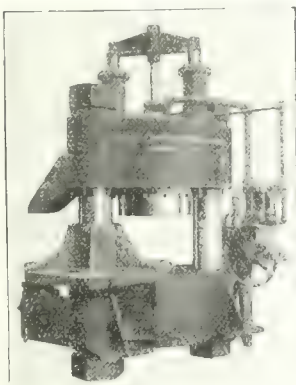
Asa S. Cook Co.

Hartford,  
Conn.



WE MANUFACTURE RIVETS of every description,  $\frac{1}{2}$  inch. dia. and smaller.

PARMENTER & BULLOCH CO., LTD.  
GANANOQUE, ONT.



## ELMES HYDRAULIC PRESSES

Rapid-acting hydraulic drawing presses, piercing presses, pumps, and accumulators for making Shells, etc. High pressure fittings and valves, quick shipment.

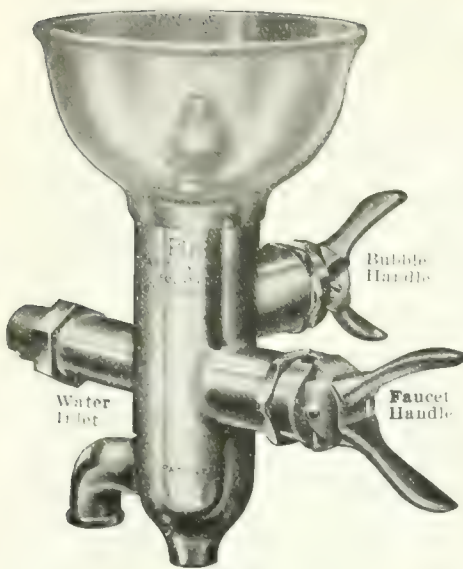
Send for our illustrated catalog to-day

**Charles F. Elmes Engineering Works**

217 N. Morgan Street, Chicago, U.S.A.

Over 50 years' experience building hydraulic machinery.

*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*



## Saving or Wasting?

The manner in which you handle the drinking water problem in your plant may seem to be a small matter to you—but investigate. The results will be surprising.

The old-time faucet is costly. Running hour after hour, day after day, its constant flow is costing you money, yet without any better service.

### Puro Saves 35%

A Puro Sanitary Drinking Fountain will cut that water bill 35%. We can prove that it has done that for others.

It will give every employee a safer, saner draught of bubbling water free from the contamination of the common drinking cup.

In a word, it is the only sanitary Drinking Fountain that is really safe, sanitary, simple, automatic in control, and easy to attach.

## "PURO - FY"

(MADE IN CANADA)

YOUR WATER SUPPLY

Puro Sanitary Drinking Fountain Company  
147 University Ave., Toronto, Canada

## Want Ads.

There is someone who is looking for just such a proposition as you have to offer. For two cents a word you can speak across the continent with a condensed advertisement in this paper.

TRY IT OUT

Adam Beck in impressing upon the Ontario Government the importance and necessity of new power development. The Cabinet has had the plans and estimates of the Hydro Commission before it for nearly two months past, but the size of the project has made many conferences necessary between the Ministers and the chairman and his engineers. The new development, which, as Sir Adam Beck announced some time ago, will utilize the overflow of the Welland Canal, will, at the outset, be composed of two units of 50,000 h.p. each. By the time they are ready the consumption of power by the Hydro System will, it is expected, be sufficient to immediately give business to both units. The plans provide for utilizing the Chippewa Creek and carrying the water by an open canal across country to a point below the Whirlpool.

## Personal

Gladstone Whitelaw, supt. of the Oxford Foundry, Woodstock, Ont., died on Nov. 29.

George Goodwin, at one time a prominent contractor, died at Ottawa on Nov. 28, aged 72 years.

W. J. McCully has been elected president of the Stratford Board of Trade for the ensuing year. J. Stevenson is secretary.

W. J. Tubman has succeeded James Preston as factory superintendent of the Canadian Allis-Chalmers, Ltd., at Stratford, Ont.

Frank Doty of the Doty Engine Works, Goderich, Ont., has joined the Field Artillery, and is now in camp at Guelph, Ont.

Joseph Harper Harrison, one of the oldest paper box makers in Toronto, died last Saturday night. Deceased was born in Manchester, Eng., in 1849, and came to Toronto at the age of 22.

Capt. W. Murchison, one of the veteran masters of Lake Ontario and Toronto harbor, died on Friday last. Capt. Murchison, who was born in Toronto 65 years ago, sailed on the lakes for over forty years.

## Catalogues

Automatic Die-Head made by the Eastern Machine Screw Corporation, New Haven, Conn., is described and illustrated in a bulletin recently issued. The construction of the "H. & G." automatic self-opening die-head is fully dealt with and the various parts illustrated and listed.

Foundry Torch.—Two bulletins issued by the Mahr Manufacturing Co.,

## INGOT METALS

In stock and for import.

ANTIMONY  
TIN, COPPER,  
LEAD, ZINC  
ALUMINUM

A. C. LESLIE & CO.  
LIMITED  
MONTREAL

## METAL STAMPINGS

We are manufacturers of stamped parts for other manufacturers.

We do any kind of sheet metal stamping that you require. Our improved presses and plating plant enable us to produce the finest quality of work in a surprisingly short time.

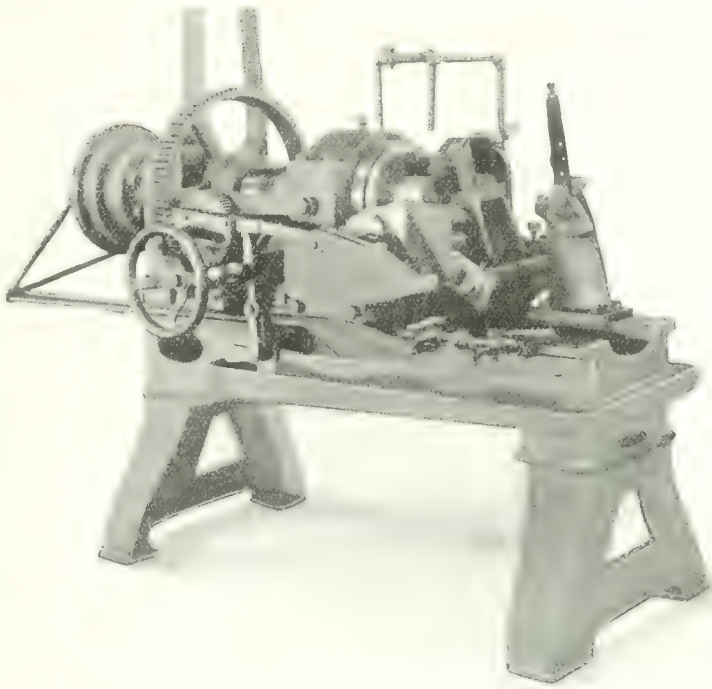
We can finish steel stamping in Nickel, Brass or Copper.

Send us a sample order.

W. H. BANFIELD & SONS  
372 Pape Avenue Toronto



# Single Purpose Lathes for Shell Work



Lathe for Grooving, Waving and Undercutting the Copper Band Section of 4.5 and 60 pdr. 5 in. Shells.

## DRIVING BAND SEAT

This Lathe is equipped with air chuck and friction, for grooving, waving and undercutting of 4.5 and 5" British High Explosive Shells, operates fast and accurately, and can be tooled when required for equivalent millimeter sizes of French and Russian Shells. Semi-automatic in nature, and one operator can easily take care of two machines. For full particulars write

**The Jenckes Machine Co.,  
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Sherbrooke, Province of Quebec, Canada

SALES OFFICES: Montreal, Toronto, St. Catharines, Vancouver. AGENCIES: London, England, E. J. Barrett, Savoy Hotel, Paris, France, Cam & Am. Co. Inc. 10 Avenue 126 Rue de Beaune

# Advertisers Cannot Be Overlooked

Being in the background of a manufacturer's mind at a moment which decides the direction business shall take, may mean serious losses. When you advertise you cannot be overlooked—you always receive consideration—a consideration above that accorded the house that does not see the benefit of talking to the manufacturer when he has the time to listen — when he sits down to read *Canadian Machinery*.

*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*

Minneapolis, Minn., describe and illustrate the "Mesta" patent portable foundry torch. The illustrations show the torch being used on various classes of work in the foundry and demonstrate the utility of this appliance.

**Barometric Condensers.**—Bulletin R., issued by the Mesta Machine Co., Pittsburgh, Pa., illustrates and describes the "Mesta" barometric condenser for steam power plants. The principal features of this type of condenser are dealt with at length, while in addition the bulletin contains a description of the "Mesta" dry air pump.

**Moulding Machines.** The catalogue edition of "The Merry Moulder" for September is devoted entirely to a review of the various types of moulding machines made by the Osborn Manufacturing Co., Cleveland, O. A number of excellent illustrations show the various types, and the methods of operation are described, accompanied by the principal dimensions for each size of machine.

**"Lagonda" Valves.**—The latest publication, N-3, issued by the Lagonda Mfg. Co., of Springfield, Ohio, is a 24-page bulletin on their triple-acting automatic cut-off valves and non-return valves. This book briefly, but completely, discusses the function of these valves, and illustrates the several types made by the Lagonda Mfg. Co., which are the standard angle type and straight way valve, the low squat body valve for low head room, and the horizontal valve. A copy of this bulletin will be sent to any copy of this bulletin will be sent to interested readers on application.

## Book Reviews

**Report of the Selby Smelter Commission,** by J. A. Holmes, E. C. Franklin, and R. A. Gould. 1915. 528 pp., 41 pls., 14 figs. One volume. Paper covers. \$1.25. This No. 98 bulletin describes in detail the methods used, some of them new, in determining the contamination of the air and the damage to trees, crops, and live stock by the smoke and fume from the Selby Smelter, in California, and gives the conclusions of the commission on the methods used by the smelter company to prevent injury. The bulletin is of especial interest to metallurgical companies, municipal or State boards of health, and persons investigating damage by smelter smoke. Owing to the expense involved in the preparation and publication of this bulletin and the limited printing funds available for the use of the Bureau of Mines, it has been necessary to place a price of \$1.25 on the work. Orders should not be sent to the Bureau of Mines, but should be addressed to the Superintendent of Documents, Government Printing Office, Washington, D.C.

# Classified Machinery List

## WANTED

**SALESMAN WANTED** ESTABLISHED house selling metals, machinery and supplies desires an experienced man to take charge of this line. Box 758, Canadian Machinery.

## FOR SALE

**FOR SALE** RICHARDS INDICATOR, complete, with attachments, nearly new, in perfect order. Apply Canadian Machinery, 113 University Ave., Toronto.

**STEAM ENGINES FOR SALE** ONE 10 H.P. stationary boiler and settings complete; good working order. Price one hundred dollars. One 3 to 4 H.P. upright; good working order. Price fifty dollars. Apply to H. A. Lawrence, West Shefford, Quebec.

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14 x 6 Prentiss Bros. Lathe, all Geared Head.  
No. 6 Brown & Sharpe Plain Screw Machine, Back Geared.  
16 in. DAVIS & EGAN Screw Machine, Back Geared, Friction Head.  
30 in. Lodge & Shipley Pulley Lathe with Turret, 1" Hollow Spindle.

**American Machinery Exchange**  
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## Machinery For Sale

- 1—Automatic Gridley, 14" capacity.
- 1—16" shaper with countershaft and swivel vise.
- 1—New 4 spindle "Reed Prentiss" Ball-Bearing Drill Press.
- 1—16 x 8 Davis Single Gear Engine Lathe.
- 1—15 x 5 Flatner Tool Room Lathe.
- 2—Fox Lathes, 1½" and 1¼" capacity.
- 4—Electric Direct Current Breast Drills, up to 3½" capacity.
- 1—3-Ton Screw Pulley Chain Block.
- 1—5-Ton Screw Pulley Chain Blocks.
- 2—4-Ton Screw Pulley Chain Blocks.

**Ontario Metal Products Co.**  
Limited  
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Eight Cleveland Automatic Screw Machines, with 3½" spindle capacity, 1909 model. First-class condition.

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- One Garvin No. 3 turret lathe, 18" swing, with 2½" hole through spindle, back geared and friction head.
- One Garvin No. 2½" turret lathe, 16" swing, 1½" hole through spindle, back geared and friction head.
- One American Tool Works Co. turret lathe, 18" swing with 3" hole through spindle, equipped with back gear, friction head.
- One Pratt & Whitney No. 3 turret lathe, 14" swing, 1¼" hole through spindle, back geared and friction head.
- One No. 3 Pratt & Whitney screw machine, 14" swing, 1" hole through spindle, with wire feed attachment, plain head.
- One Davis & Egan No. 3 screw machine, 12" swing with 1" hole through spindle, complete with wire feed, plain head.
- One Garvin wire feed screw machine, 12" swing with 1" wire feed capacity, plain head.
- One Warner & Swasey plain head turret lathe, 14" swing with 1" spindle capacity.
- One Windsor plain head turret lathe, 11" swing with 1" spindle capacity.
- One 16" x 5" Gage Fox Mott Co. brass turning lathe, back gears.

## Girard Machine and Tool Co.

491-493 N. Third Street, Philadelphia, Pa.



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Brown & Sharpe No. 2, 7½ inch (2)  
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Pratt & Whitney, 1 inch.  
Hartford, 1 inch.  
Cleveland ¾ inch, friction disc feed (5)  
Cleveland ¾ inch, plain (2)  
Cleveland ½ inch, plain (15)  
Cleveland 2 inch friction jigger.  
Wells ½ inch.

**Lathes**

12" x 5' Fairbanks  
14" x 6' Silk.  
16" x 6' LeBlond  
20" x 10' Fitchburg  
25" x 12' Reed.

**Planers**

30" x 24" x 8' Pease.  
30" x 30" x 8' Gray.  
24" x 24" x 6' Lodge & Davis.  
36" x 36" x 8' Fitchburg.  
36" x 35" x 15' Woodward & Powell.

**Presses**

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Bliss No. 42 o.b.i. (3)  
Rockford No. 2 o.b.i.  
American Can No. 3 o.b.i.  
American Can No. 4 o.b.i.  
American No. 4½ o.b.i.  
Wold No. 12 open back (5)  
Crosby No. 40 open back (4)  
Crosby No. 18 o.b.i.  
Crosby No. 19 o.b.i. (4)  
Crosby No. 119 o.b.i.  
Crosby No. 1 o.b.i. (4)  
Bliss No. 69-N Double Acting  
Adriance No. 12 A Double-Acting  
George A. Ohl 3' Press or Brake  
Stiles No. 3 Solid Back (2)

**Milling Machines**

Brown & Sharpe No. 4 Universal  
Brown & Sharpe No. 12 Lincoln (5)  
Brainard No. 7 Lincoln  
Newton No. 4 Plain  
Fox No. 3, Hand and Power  
Brown & Sharpe No. 11 Lincoln (2)  
Warner & Swasey No. 2 Disc Sinkers

**Shapers**

16" Stockbridge, crank  
15" Hendey Tool Room  
20" Smith & Mills, b.g.  
21" Averbeck, b.g.  
20" Gould & Eberhardt, b.g.

**Drill Presses**

20" Square Base W & L feed (10)  
20" Wheel, lever and power feed (5)  
20" Wheel, lever and power feed, b.g. (4)  
21" Stationary Head, complete (2)  
24" Sliding Head, complete  
28" Sliding Head, complete  
31" Sliding Head, complete (2)  
Fosdick 4" Radial, Gear Box  
Prentice 5" Radial, Gear Box

**Boring and Turning Mills**

Betts 48" two swivel heads  
Barrett No. 5 Cylinder Boring Mill

**Miscellaneous**

Large stock Keyscutters, Bolt Cutters,  
Centering Machines, Wire Straighten-  
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Besly 26-18" 2-spindle Grinder with ring  
wheel chucks.

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Those who wish to sell or buy a business, obtain competent help, connect with satisfactory positions, or secure aid in starting new enterprises, should not fail to use the Want Ad. Page of "CANADIAN MACHINERY."

If you want to sell or buy a second-hand lathe, planer or any other shop equipment, let "CANADIAN MACHINERY" pick out a seller or buyer for you. How about that second-hand engine or boiler which you would like to dispose of?

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This machine is in first-  
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**Box 157  
Canadian Machinery**

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Eight Gisholt 24" Tur-  
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complete standard  
equipment as supplied  
by the makers.

Must be guaranteed in  
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**Box 159, Canadian  
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WEEKLY LIST**

Of New and Used Machine  
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15" x 5' Bardons & Oliver  
12" x 5' Woods tilted turret  
No. 2 Gray  
No. 2 Gray (3)  
No. 3 Pratt & Whitney  
No. 4 Pratt & Whitney  
5" Cleveland automatic  
5" Cleveland automatic  
8" x 24" Brown & Sharpe  
6" x 28" Brown & Sharpe (3)  
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Gray double turret

**Engine Lathes**

42" x 20' Pinell  
42" x 14' Bradford  
42" x 20' Bradford  
30" x 12' Putnam  
30" x 10½' Pond  
26" x 14' Gleason (3)  
25" x 14' Fitchburg  
25" x 10' Bradford  
24" x 24' Pinell  
24" x 14' Putnam  
24" x 8' Day & Scott  
24" x 8' Fitchburg (3)  
20" x 10' Powell  
20" x 8' Bullard  
18" x 8' Bradford  
18" x 8' Fitchburg  
18" x 6' Ames  
17" x 8' Blaisdell  
17" x 6' LeBlond  
16" x 8' Harrington  
15" x 6' 17' other

**Upright Drills**

20" B. Lloyd (3)  
21" Keon  
20" Becker heavy duty  
20" Buffel (4)  
20" Bertram (2)  
20" Backford  
20" Barnes  
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14" W. H. Miller

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30" x 20" x 10' Putnam (2 heads)  
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16" x 24" Fitchburg traverse  
20" Smith & Mills  
24" Hendey  
20" Becker  
16" Gray

**Milling Machines**

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No. 12 Brown & Sharpe plain (2)  
No. 3 Cincinnati plain

**Presses**

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No. 40 Bliss  
No. 5 W. H. Miller  
No. 4 Sarnia  
No. 2 Davis

**Miscellaneous**

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machine  
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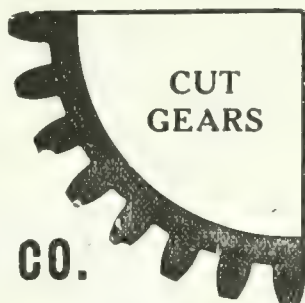
# HINTS TO BUYERS

## GEARS

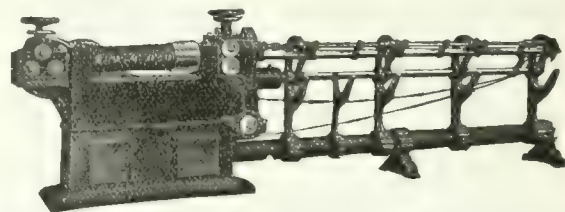
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Either Hand or Power.

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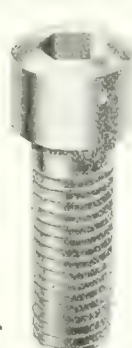
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Safety Set Screw

Socket Cap Screw



### Allen Safety Set Screws and Socket Cap Screws



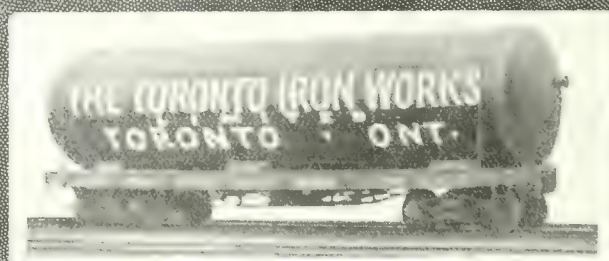
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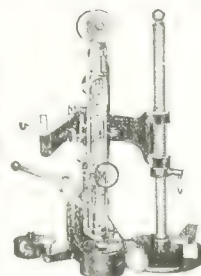
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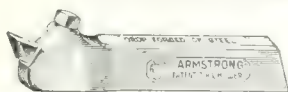
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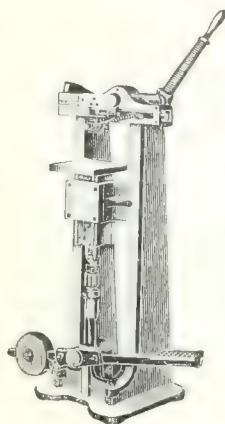
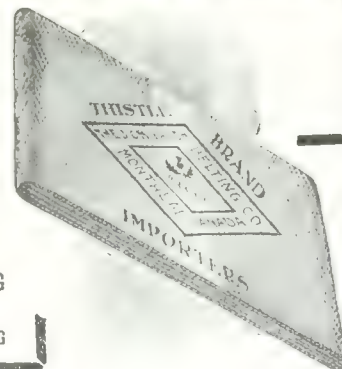
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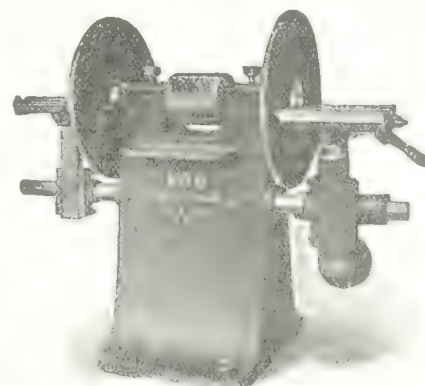
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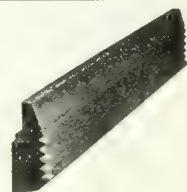
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H. W. Petrie, Toronto.  
Stevens, F. B., Detroit, Mich.
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L'Air Liquide Society, Montreal, Toronto.  
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- Accumulators, Hydraulic.**  
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Southwark Foundry & Machine Co., Philadelphia.  
Wm. Tool Company, Youngstown, O.  
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Wood, R. D., & Co., Philadelphia.
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Whiting Foundry Equipment Co., Harvey, Ill.
- Air Hose.**  
Can. H. W. Johns-Manville Co., Limited, Toronto.  
Cleveland Pneumatic Tool Co. of Canada, Toronto.  
Can. Ingersoll-Rand Co., Montreal.
- Air Receivers.**  
Can. Ingersoll-Rand Co., Montreal.  
MacKinnon Holmes Co., Sherbrooke, Que.
- Air Washers.**  
Buffalo Forge Co., Buffalo, N.Y.  
Can. Sirocco Co., Ltd., Windsor, Ont.
- Annometers.**  
Can. H. W. Johns-Manville Co., Limited, Toronto.
- Aluminum.**  
Tallman Brass & Metal Co., Hamilton.
- Alloys, Steel.**  
H. A. Drury Co., Ltd., Montreal.  
Hawkrige Bros. Co., Boston, Mass.  
Vanadium Alloys Steel Co., Pittsburg, Pa.  
Vulcan Crucible Steel Co., Aliquippa, Pa.
- Annunciator Systems.**  
Lintz-Porter Co., Toronto.
- Arbors.**  
Can. Fairbanks-Morse Co., Montreal.  
Cleveland Twist Drill Co., Cleveland.  
Morse Twist Drill and Machine Co., New Bedford.  
H. W. Petrie, Toronto.  
Plessisville Foundry, Plessisville, Que.  
Pratt & Whitney Co., Dundas, Ont.
- Assembling Stands.**  
Skinner Chuck Co., New Britain, Conn.
- Automatic Chucks.**  
Garvin Machine Co., New York.
- Asbestos Packing.**  
Can. H. W. Johns-Manville Co., Limited, Toronto.
- Autogenous Welding and Cutting Plants.**  
L'Air Liquide Society, Montreal, Toronto.  
Lever Bros., Toronto.
- Automatic Index Milling Machines.**  
Garvin Machine Co., New York.  
National Machinery and Supply Co., Hamilton.  
H. W. Petrie, Toronto.
- Automatic Machinery.**  
Baird Machine Co., Bridgeport, Conn.  
A. R. Williams Machy. Co., Toronto.  
Gardner, Robt., & Son, Montreal.  
Grant Machine & Tool Co., Philadelphia, Pa.  
Mott & Merryweather Machy. Co., Cleveland, O.  
National Machinery & Supply Co., Hamilton.  
H. W. Petrie, Toronto.
- Pratt & Whitney Co., Dundas, Ont.  
Owen Sound Iron Works Co., Owen Sound.  
Windsor Machine Co., Windsor, Vt.  
Automatic Multiple Spindle.  
Windsor Machine Co., Windsor, Vt.  
Automatic Wood Screw Machines.  
Asa F. Cook Co.  
Ayle Cutters.  
Butterfield & Co., Rock Island, Que.  
A. B. Jardine & Co., Hespeler, Ont.  
Babbitt Metal.  
Can. Fairbanks-Morse Co., Montreal.  
Hoyt Metal Co., Toronto.  
Magnolia Metal Co., Montreal.  
H. W. Petrie, Toronto.  
Tallman Brass & Metal Co., Hamilton.
- Baking Ovens.**  
Oven Equipment & Mfg. Co., New Haven, Conn.  
Owen Sound Iron Works Co., Owen Sound.
- Ball Bearings.**  
Can. Fairbanks-Morse Co., Montreal.  
Chapman Double Ball Bearing Company, Toronto.  
H. W. Petrie, Toronto.
- Ball Burnishing Machines.**  
Baird Machine Co., Bridgeport, Conn.  
Banding Machines, Hydraulic.  
West Tire Setter Co., Rochester, N.Y.
- Barrels, Steel Shop.**  
Baird Machine Co., Bridgeport, Conn.  
Cleveland Wire Spring Co., Cleveland.
- Bar Steel.**  
Steel Co. of Canada, Hamilton, Ont.
- Bars, Rolling.**  
Charles F. Elmes Eng. Works, Chicago.  
Niles-Rement-Pond Co., New York.  
Owen Sound Iron Works Co., Owen Sound.
- Bar Benders and Straight Edges.**  
Steel Bending Brake Works, Ltd., Chatham, Ont.
- Bar Benders, Hydraulic.**  
Charles F. Elmes Eng. Works, Chicago.  
Watson-Stillman Co., Aldene, N.J.
- Bar Twisting Machines.**  
Mesta Machine Co., Pittsburg, Pa.
- Batteries and Accessories.**  
Lintz-Porter Co., Toronto.
- Ball Systems.**  
Lintz-Porter Co., Toronto.
- Belt Benches.**  
Tabor Mfg. Co., Philadelphia, Pa.
- Belt Dressing and Cement.**  
Graton & Knight Mfg. Co., Montreal.
- Belt Lacing, Leather.**  
Graton & Knight Mfg. Co., Montreal.
- Beltting, Chain.**  
Can. Fairbanks-Morse Co., Montreal.  
Graton & Knight Mfg. Co., Montreal.  
Jones & Glasco, Montreal.  
Morse Chain Co., Ithaca, N.Y.  
H. W. Petrie, Toronto.
- Beltting, Cotton.**  
General Supply Co. of Canada, Ltd., Ottawa.  
Dominion Beltting Co., Hamilton.  
H. W. Petrie, Toronto.
- Beltting, Leather.**  
Can. Fairbanks-Morse Co., Montreal.  
General Supply Co. of Canada, Ltd., Ottawa.  
Grant Machine & Tool Co., Philadelphia, Pa.  
Graton & Knight Mfg. Co., Montreal.  
Main Beltting Co., Montreal.  
Morse Chain Co., Ithaca, N.Y.  
H. W. Petrie, Toronto.
- Beltting, Rubber.**  
Can. H. W. Johns-Manville Co., Limited, Toronto.
- Benders, Angle and Tee Iron.**  
Can. Buffalo Forge Co., Montreal.  
Watson-Stillman Co., Aldene, N.J.
- Bending Machinery.**  
John Bertram & Sons Co., Dundas.  
Bertrams, Limited, Edinburgh, Scotland.  
Bliss, E. W., Co., Brooklyn, N.Y.  
Brown, Boggs Co., Ltd., Hamilton, Canada.  
Can. Buffalo Forge Co., Montreal.  
Can. Machinery Corporation, Galt, Ont.  
Charles F. Elmes Eng. Works, Chicago.  
Jardine, A. B., & Co., Hespeler, Ont.  
National Machinery Co., Tiffin, Ohio.  
National Machinery & Supply Co., Hamilton.
- Niles-Rement-Pond Co., New York.  
Owen Sound Iron Works Co., Owen Sound.  
H. W. Petrie, Toronto.  
Toledo Machine & Tool Co., Toledo, O.  
Steel Bending Brake Works, Chatham, Ont.  
Watson-Stillman Co., Aldene, N.J.  
Bliss, Steel.  
Dennis Wire & Iron Works Co., Ltd., London, Canada.  
Mott & Merryweather Machy. Co., Chicago, Ill.  
Quebec Iron Works Co., Sherbrooke, Que.  
Toronto Iron Works, Ltd., Toronto.  
Wells Bros. Co., Greenfield, Mass.  
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.
- Blast Gauges, Cupola.**  
Can. Buffalo Forge Co., Montreal.  
Sheldons, Ltd., Galt, Ont.  
Whiting Foundry Equipment Co., Harvey, Ill.
- Blocks, Lifting.**  
Northern Crane Works, Walkerville.  
Blowers.  
Can. Buffalo Forge Co., Montreal.  
Can. Sirocco Co., Ltd., Windsor, Ont.  
Chicago Flexible Shaft Co., Chicago.  
Grant Machine & Tool Co., Philadelphia, Pa.  
Sheldons, Ltd., Galt, Ont.  
Southwark Foundry & Machine Co., Philadelphia.
- Blow Pipes and Regulators.**  
L'Air Liquide Society, Montreal, Toronto.  
Lever Bros., Toronto.
- Bluing Ovens.**  
Oven Equipment & Mfg. Co., New Haven, Conn.
- Boilers.**  
Can. Locomotive Co., Kingston, Ont.  
General Supply Co. of Canada, Ltd., Ottawa.  
M. K. Holmes Co., Sherbrooke, Que.  
National Machinery & Supply Co., Hamilton.  
Owen Sound Iron Works Co., Owen Sound.  
H. W. Petrie, Toronto.  
Plessisville Foundry, Plessisville, Que.
- Boiler Compounds.**  
Can. H. W. Johns-Manville Co., Limited, Toronto.
- Boiler Graphite.**  
Dixon Crucible Co., Jersey City, N.J.
- Boiler Makers' Supplies.**  
Jno. F. Allen Co., New York.
- Bolt Cutters and Nut Tapers.**  
Wells Brothers Co., Greenfield, Mass.
- Bolts.**  
Galt Machine Screw Co., Galt, Ont.  
London Bolt & Hinge Works, London, Ont.  
Steel Co. of Canada, Hamilton, Ont.
- Bolt and Nut Machinery.**  
A. R. Williams Machy. Co., Toronto.  
John Bertram & Sons Co., Dundas.  
Owen Sound Iron Works Co., Owen Sound.  
Gardner, Robt., & Son, Montreal.  
Landis Machine Co., Waynesboro, Pa.  
National Machinery Co., Tiffin, O.  
National Machinery & Supply Co., Hamilton.  
H. W. Petrie, Toronto.  
Wiley & Russell Co., Greenfield, Mass.
- Book.**  
MacLean Publishing Co., Toronto.
- Boring Machines, Upright and Horizontal.**  
John Bertram & Sons Co., Dundas.  
Colburn Machine Tool Co., Franklin, Pa.  
Garlock-Machinery, Toronto.  
Grant Machine & Tool Co., Philadelphia, Pa.  
Hall, Clarke & Co., of Chicago, Chicago, Ill.  
Mott & Merryweather Machy. Co., Cleveland, O.  
National Machinery & Supply Co., Hamilton.  
Niles-Rement-Pond Co., New York.  
Owen Sound Iron Works Co., Owen Sound.  
Stow Mfg. Co., Binghamton, N.Y.
- Boring Machines, Pneumatic.**  
Cylinder.  
Baker Brothers, Toledo, O.  
Cleveland Pneumatic Tool Co. of Canada, Toronto.  
Can. Fairbanks-Morse Co., Montreal.  
Can. Ingersoll-Rand Co., Montreal.  
Independent Pneumatic Tool Co., Chicago, Ill.  
H. W. Petrie, Toronto.  
Stow Mfg. Co., Binghamton, N.Y.
- Boring and Turning Mills.**  
John Bertram & Sons Co., Dundas.  
Grant Machine & Tool Co., Philadelphia, Pa.  
National Machinery & Supply Co., Hamilton.  
Niles-Rement-Pond Co., New York.  
H. W. Petrie, Toronto.  
Boxes, Annealing, Charging.  
Mesta Machine Co., Pittsburg, Pa.  
Box Puller.  
Jardine, A. B., & Co., Hespeler, Ont.  
Boxes, Steel Shop.  
Cleveland Wire Spring Co., Cleveland.  
Boxes, Tote.  
Cleveland Wire Spring Co., Cleveland.  
Brakes.  
Brown, Boggs & Co., Hamilton, Can.  
Whiting Foundry Equipment Co., Harvey, Ill.  
Brakes, Heavy Plate Bending and Corning.  
Steel Bending Brake Works, Ltd., Chatham, Ont.  
Brass Working Machinery.  
A. R. Williams Machy. Co., Toronto.  
Gardner, Robt., & Son, Montreal.  
Grant Machine & Tool Co., Philadelphia, Pa.  
National Machinery & Supply Co., Hamilton.  
Warner & Swasey Co., Cleveland.  
Niles-Rement-Pond Co., New York.  
H. W. Petrie, Toronto.
- Brick Cars.**  
Can. Buffalo Forge Co., Montreal.  
Sheldons, Ltd., Galt, Ont.
- Brick Dryers.**  
Can. Buffalo Forge Co., Montreal.  
Can. Sirocco Co., Ltd., Windsor, Ont.  
Sheldons, Ltd., Galt, Ont.
- Brick Machinery.**  
Eastern Machinery Co., New Haven.  
Sheldons, Ltd., Galt, Ont.
- Bridges, Railway and Highway.**  
Can. Bridge Co., Walkerville, Ont.  
MacKinnon Holmes Co., Sherbrooke, Que.
- Bubblers.**  
P. A. Sargent Trucking Foundation Co., Hamilton, Ont.
- Buckets, Clam Shell, Crab and Dump.**  
Newham Crane Works Ltd., Walkerville, Ont.  
Whiting Foundry Equipment Co., Harvey, Ill.
- Buffing and Polishing Machinery.**  
Canadian Hart Wheels, Ltd., Hamilton, Ont.  
Ford-Smith Machine Co., Hamilton, Ont.  
Grant Machine & Tool Co., Philadelphia, Pa.  
New Britain Machine Co., New Britain, Conn.
- Bulldozers.**  
John Bertram & Sons Co., Dundas.  
E. W. Bliss Co., Brooklyn, N.Y.  
Canada Mach. Corporation, Galt, Ont.  
National Machinery & Supply Co., Hamilton, Ont.  
Watson-Stillman Co., Aldene, N.J.
- Burners, Enclosed Flame Gas.**  
Oven Equipment & Mfg. Co., New Haven, Conn.
- Burners, Fuel, Oil and Natural Gas.**  
Newham Crane Works Ltd., Walkerville, Ont.  
Whiting Foundry Equipment Co., Harvey, Ill.
- Burring Reamers.**  
Wells Brothers Company, Greenfield, Mass.
- Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.**
- Butterfisk.**  
Wells Brothers Company, Greenfield, Mass.
- Burns, Iron and Copper.**  
Parmenter & Bullock Co., Gananoque.
- Canners' Machinery.**  
Bliss, E. W., Co., Brooklyn, N.Y.  
Brown, Boggs & Co., Hamilton, Can.  
National Machinery & Supply Co., Hamilton, Ont.
- Calissons.**  
Toronto Iron Works, Ltd., Toronto.
- Cars, Charging Box Ingot.**  
Mesta Machine Co., Pittsburg, Pa.
- Cars, Industrial.**  
Can. Buffalo Forge Co., Montreal.  
Can. Fairbanks-Morse Co., Montreal.  
Sheldons, Limited, Galt, Ont.  
Whiting Foundry Equipment Co., Harvey, Ill.



**Castings, Aluminum.**

Cunningham & Son, St. Catharines, Ont.  
Owen Sound Iron Works Co., Ltd., Owen Sound, Ont.  
St. Lawrence Foundry, Galt, Ont.  
Tallman Brass & Metal Co., Hamilton

**Castings, Air Furnaces.**

Wm. Tod Company, Youngstown, O.

**Castings, Brass.**

Cunningham & Son, St. Catharines, Ont.  
Alexander Fleck, Ltd., Ottawa.  
T. C. Lawrence Foundry, Galt, Ont.  
Mesta Machine Co., Pittsburg, Pa.  
Owen Sound Iron Works Co., Owen Sound.  
Plessisville Foundry, Plessisville, Que.  
Tallman Brass & Metal Co., Hamilton  
Wm. Tod Company, Youngstown, O.

**Castings, Bronze.**

Cunningham & Son, St. Catharines, Ont.  
Mesta Machine Co., Pittsburg, Pa.  
Tallman Brass & Metal Co., Hamilton  
Wm. Tod Company, Youngstown, O.

**Castings, Copper.**

Cunningham & Son, St. Catharines, Ont.  
Tallman Brass & Metal Co., Hamilton, Ont.

**Castings, Gray Iron.**

Brown, Begg Co., Ltd., Hamilton, Canada.  
Erie Foundry Co., Erie, Pa.  
Alexander Fleck, Ltd., Ottawa.  
Gardner, Robt., & Son, Montreal.  
Hull Iron & Steel Foundries, Ltd., Hull, Quebec.  
Mesta Machine Co., Pittsburg, Pa.  
Owen Sound Iron Works Co., Owen Sound.  
Plessisville Foundry, Plessisville, Que.  
Wm. Tod Company, Youngstown, O.

**Castings, Steel Chrome and Manganese Steel.**

Hull Iron & Steel Foundries, Ltd., Hull, Quebec.  
Mesta Machine Co., Pittsburg, Pa.  
Wm. Tod Company, Youngstown, O.

**Castings, Malleable.**

Galt Malleable Iron Co., Galt.

**Castings, Nickel Steel.**

Hull Iron & Steel Foundries, Ltd., Hull, Quebec.  
Mesta Machine Co., Pittsburg, Pa.

**Cement, Disc Wheel.**

Gardner Machine Co., Beloit, Wis.

**Cement, Iron.**

Can. H. W. Johns-Manville Co., Limited, Toronto.  
Shelton Metallic Filler Co., Derby, O.

**Cement Machinery.**

Can. Fairbanks-Morse Co., Montreal.  
Gardner, Robt., & Son, Montreal.  
National Machinery & Supply Co., Hamilton, Ont.  
Owen Sound Iron Works Co., Owen Sound.  
H. W. Petrie, Toronto.

**Centre Reamers.**

Wells Brothers Co., Greenfield, Mass.

**Centering Machines.**

John Bertram & Sons Co., Dundas.  
Gardner, Robt., & Son, Montreal.  
Girard Machine & Tool Co., Philadelphia, Pa.  
Hurlbut, Rogers Machinery Co., South Sudbury, Mass.  
National Machinery & Supply Co., Hamilton.  
Niles-Bement-Pond Co., New York.  
Pratt & Whitney Co., Dundas, Ont.

**Centrifugal Pumps.**

Can. Buffalo Forge Co., Montreal.  
H. W. Petrie, Toronto.  
Pratt & Whitney Co., Dundas, Ont.  
Southwark Foundry & Machine Co., Philadelphia, Pa.  
Smart-Turner Machine Co., Hamilton, Ont.

**Chain Blocks.**

Can. Fairbanks-Morse Co., Montreal.  
National Machinery & Supply Co., Hamilton.  
H. W. Petrie, Toronto.

**Chains, Silent and Transmission.**

Jones & Glasco, Montreal.  
Morse Chain Co., Ithaca, N.Y.  
Plessisville Foundry, Plessisville, Que.

**Chemists.**

Can. Inspection & Testing Laboratories, Ltd., Montreal.  
Toronto Testing Laboratory, Ltd., Toronto.

**Chucks, Aero, Automatic.**

Gardner Machine Co., New York.

**Chucks, Drill, Lathe and Universal.**

John Bertram & Sons Co., Dundas, Ont.  
Buffalo Forge Co., Buffalo, N.Y.  
Can. Fairbanks-Morse Co., Montreal.

**Cleveland Twist Drill Co., Cleveland.**

Cushman Chuck Co., Hartford, Conn.  
Gardner, Robt., & Son, Montreal.  
Girard Machine & Tool Co., Philadelphia, Pa.  
Wells Brothers Co., Greenfield, Mass.  
Jacobs Mfg. Co., Hartford, Conn.  
Ker & Goodwin, Brantford.  
Modern Tool Co., Erie, Pa.  
Morse Twist Drill & Machine Co., New Bedford.  
National Machinery & Supply Co., Hamilton.

**H. W. Petrie, Toronto.**

Skinner Chuck Co., New Britain, Conn.  
D. E. Whiton Machine Co., New London, Conn.  
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

**Chucks, Drill, Automatic and Keyless.**

Buffalo Forge Co., Buffalo, N.Y.

**Chucks, Ring Wheel.**

Gardner Machine Co., Beloit, Wis.

**Chucking Machines.**

Gardner Machine Co., New York.  
Girard Machine & Tool Co., Philadelphia, Pa.  
New Britain Machine Co., New Britain, Conn.  
Niles-Bement-Pond Co., New York.  
Turner Machine Co., Danbury, Conn.  
Warner & Swasey Co., Cleveland, O.

**Circular Safety Cylinders.**

Owen Sound Iron Works Co., Owen Sound, Ont.

**Clocks, Time and Watchman's.**

Lintz-Porter Co., Toronto.

**Cloth and Wool Dryers.**

Canada Wire & Iron Goods Co., Hamilton, Ont.  
Sheldons, Limited, Galt.

**Clutches.**

Eastern Machinery Co., New Haven, Conn.  
Jones & Glasco, Montreal.  
Owen Sound Iron Works Co., Owen Sound.  
Positive Clutch & Pulley Works, Ltd., Toronto.

**Coal Handling Machinery.**

Northern Crane Works, Ltd., Walkerville, Ont.  
Whiting Foundry Equipment Co., Harvey, Ill.

**Coke and Coal.**

Hanna & Co., M. A., Cleveland, O.

**Collectors, Pneumatic.**

Can. Buffalo Forge Co., Montreal.

**Sheldons, Limited, Galt.****Compressors, Air.**

Cleveland Pneumatic Tool Co. of Canada, Toronto.  
Independent Pneumatic Tool Co., Chicago.  
Mesta Machine Co., Pittsburg, Pa.  
National Machinery & Supply Co., Hamilton.  
H. W. Petrie, Toronto.  
Southwark Foundry & Machine Co., Philadelphia, Pa.  
The Smart-Turner Machine Co., Hamilton.

**Concentrating Plant.**

Gardner, Robt., & Son, Montreal.

**Concrete Mixers.**

A. R. Williams Machy. Co., Toronto.  
Can. Fairbanks-Morse Co., Montreal.  
National Machinery & Supply Co., Hamilton.  
H. W. Petrie, Toronto.

**Concrete Reinforcement.**

Canada Wire Goods Mfg. Co., Hamilton.

**Condensers.**

Can. Buffalo Forge Co., Montreal.  
Mesta Machine Co., Pittsburg, Pa.  
The Smart-Turner Machine Co., Hamilton.  
Southwark Foundry & Machine Co., Philadelphia, Pa.  
Wm. Tod Company, Youngstown, O.

**Contracting Engineers, Electrical.**

Lintz-Porter Co., Toronto.

**Controllers and Starters.**

Electric Motor.  
A. R. Williams Machy. Co., Toronto.  
H. W. Petrie, Toronto.  
Toronto & Hamilton Electric Co., Hamilton, Ont.

**Conveyor Machinery.**

Booth, W. D., & Son, Toronto.  
Can. Fairbanks-Morse Co., Montreal.  
National Machinery & Supply Co., Hamilton, Ont.

**H. W. Petrie, Toronto.**

Plessisville Foundry, Plessisville, Que.  
The Smart-Turner Machine Co., Hamilton.

**Coping Machines.**

Can. Buffalo Forge Co., Montreal.

John Bertram & Sons Co., Dundas.  
National Machinery & Supply Co., Hamilton, Ont.  
Niles-Bement-Pond Co., New York.

**Cornice Brakes.**

Brown Begg Co., Ltd., Hamilton, Canada.  
Steel Bending Brake Wks., Chatham.

**Counting Machines.**

W. N. Durant Co., Milwaukee, Wis.  
National Scale Co., Chicopee Falls, Mass.  
C. J. Root Co., Bristol, Conn.

**Counterbores and Countersinks.**

Cleveland Twist Drill Co., Cleveland.  
Morse Twist Drill & Machine Co., New Bedford.  
Pratt & Whitney Co., Dundas, Ont.  
Wells Bros. Co., Greenfield, Mass.  
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

**Countershafts.**

Baird Machine Co., Bridgeport, Conn.  
Wells Bros. Co., Greenfield, Mass.

**Country House Lighting and Cooking.**

Can. Blaugas Co., Montreal.

**Couplings.**

Can. H. W. Johns-Manville Co., Ltd., Toronto.  
Eastern Machinery Co., New Haven, Conn.  
Gardner, Robt., & Son, Montreal.  
Owen Sound Iron Works Co., Owen Sound, Ont.

**Couplings, Air Hose.**

Cleveland Pneumatic Tool Co. of Canada, Toronto.

**Crabs, Travelling.**

Owen Sound Iron Works Co., Owen Sound.

**Cranes, Locomotive.**

Northern Crane Works, Walkerville.

**Cranes, Gantry.**

Northern Crane Works, Walkerville.  
Smart-Turner Machine Co., Hamilton, Ont.  
Whiting Foundry Equipment Co., Harvey, Ill.

**Cranes, Goliath.**

Herbert Morris Crane & Hoist Co., Ltd., Toronto.  
Northern Crane Works, Walkerville.  
Whiting Foundry Equipment Co., Harvey, Ill.

**Cranes, Hydraulic.**

Southwark Foundry & Machine Co., Philadelphia.  
Watson-Stillman Co., Aldene, N.J.

**Cranes, Pneumatic.**

Northern Crane Works, Walkerville.  
Whiting Foundry Equipment Co., Harvey, Ill.

**Cranes, Post Jib.**

Northern Crane Works, Walkerville.  
Smart-Turner Machine Co., Hamilton, Ont.  
Whiting Foundry Equipment Co., Harvey, Ill.

**Cranes, Portable.**

Northern Crane Works, Walkerville.  
Whiting Foundry Equipment Co., Harvey, Ill.

**Cranes, Swing Jib.**

Northern Crane Works, Walkerville.  
Smart-Turner Machine Co., Hamilton, Ont.  
Whiting Foundry Equipment Co., Harvey, Ill.

**Cranes, Transfer.**

Northern Crane Works, Walkerville.  
Smart-Turner Machine Co., Hamilton, Ont.  
Whiting Foundry Equipment Co., Harvey, Ill.

**Cranes, Wall.**

Northern Crane Works, Walkerville.  
Smart-Turner Machine Co., Hamilton, Ont.  
Whiting Foundry Equipment Co., Harvey, Ill.

**Cranes, Travelling Electric and Hand Power.**

Dominion Bridge Co., Montreal.  
Niles-Bement-Pond Co., New York.  
Northern Crane Works, Walkerville.  
Whiting Foundry Equipment Co., Harvey, Ill.

**Cranes, All Kinds.**

Northern Crane Works, Walkerville.  
Owen Sound Iron Works Co., Owen Sound, Ont.  
Southwark Foundry & Machine Co., Philadelphia.  
Harvey, Ill.  
Whiting Foundry Equipment Co., Harvey, Ill.

**Crank Pin Turning Machine.**

Niles-Bement-Pond Co., New York.

**Crimps, Leather.**

Graton & Knight Mfg. Co., Montreal.

**Cupolas.**

Can. Buffalo Forge Co., Montreal.  
Northern Crane Works, Walkerville.  
H. W. Petrie, Toronto.  
Sheldons, Ltd., Galt, Ont.  
Whiting Foundry Equipment Co., Harvey, Ill.

**Cupola and Blast Gate Blowers.**

Can. Sirocco Co., Ltd., Windsor, Ont.

**Cupola Blast Gauges & Blowers.**

Sheldons, Ltd., Galt, Ont.

**Cutters, Angle, Tee Iron and Bar.**

Can. Buffalo Forge Co., Montreal.

**Cutters, Flue.**

Independent Pneumatic Tool Co., Chicago.  
Cleveland Pneumatic Tool Co. of Canada, Toronto.

**Cutters, Pipe.**

Can. Fairbanks-Morse Co., Montreal.  
A. B. Jardine & Co., Hespeler, Ont.  
Trimont Mfg. Co., Roxbury, Mass.

**Cutting Compound & Cutting Oil.**

Can. Economic Lubricant Co., Montreal.

**Can. Oil Companies, Toronto.**

Catacract Refining Co., Buffalo, N.Y.  
Crescent Oil Co., New York.  
Racine Tool & Machine Co., Racine, Wis.

**Cutter Grinders and Attachments.**

Cincinnati Milling Machine Co., Cincinnati.

Gardner Machine Co., New York.  
Girard Machine & Tool Co., Philadelphia, Pa.

**Cutters, Milling.**

A. R. Williams Machy. Co., Toronto.  
Can. Fairbanks-Morse Co., Montreal.  
Cleveland Twist Drill Co., Cleveland.  
Gardner Machine Co., New York.  
Morse Twist Drill and Machine Co., New Bedford.  
H. W. Petrie, Toronto.  
Tabor Mfg. Co., Philadelphia, Pa.  
Pratt & Whitney Co., Dundas, Ont.  
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

**Cutting-off Machines.**

Armstrong Bros. Tool Co., Chicago.  
John Bertram & Sons Co., Dundas.  
Can. Fairbanks-Morse Co., Montreal.  
Espan-Lucas Machine Wks., Philadelphia, Pa.  
Foss & Hill Machy. Co., Montreal.  
Garlock-Machinery, Toronto.  
Gardner Machine Co., New York.  
Girard Machine & Tool Co., Philadelphia, Pa.  
Geo. Gorton Machine Co., Racine, Wis.  
Hurlbut, Rogers Machinery Co., South Sudbury, Mass.  
John H. Hall & Sons, Brantford, Ont.  
Wm. Kennedy & Sons, Owen Sound, Ont.  
Nutter & Barnes Co., Hinsdale, N.H.  
H. W. Petrie, Toronto.  
Pratt & Whitney Co., Dundas, Ont.  
Tabor Mfg. Co., Philadelphia, Pa.  
L. S. Starrett Co., Athol, Mass.

**Damper Regulators.**

Can. Fairbanks-Morse Co., Montreal.

**Derricks.**

Dominion Bridge Co., Montreal.  
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

**Designers, Special Machinery.**

Baird Machine Co., Bridgeport, Conn.

**Dies and Die Stocks.**

Armstrong Mfg. Co., Bridgeport, Conn.  
Banfield, W. H. & Son, Toronto.  
Butterfield & Co., Rock Island, Que.  
Brown, Begg & Co., Hamilton, Ont.  
Can. Fairbanks-Morse Co., Montreal.  
Duncan Electrical Co., Montreal.  
Gardner, Robt., & Son, Montreal.  
Greenfield Tap & Die Corporation, Greenfield, Mass.  
A. B. Jardine & Co., Hespeler, Ont.  
Matthews, J. H., & Co., Pittsburg, Pa.  
Modern Tool Co., Erie, Pa.  
Morse Twist Drill and Machine Co., New Bedford.  
H. W. Petrie, Toronto.  
Pratt & Whitney Co., Dundas, Ont.  
Wiley & Russell, Greenfield, Mass.

**Dies for Bit Brace Use.**

Wells Brothers Co., Greenfield, Mass.

**Die Sinkers.**

Gardner Machine Co., New York.

**Dies for Machines.**

Wells Brothers Co., Greenfield, Mass.

**Die Sinking Presses, Hydraulic.**

Charles F. Elmes Eng. Works, Chicago.  
Watson-Stillman Co., Aldene, N.J.

**Dies, Self-opening.**

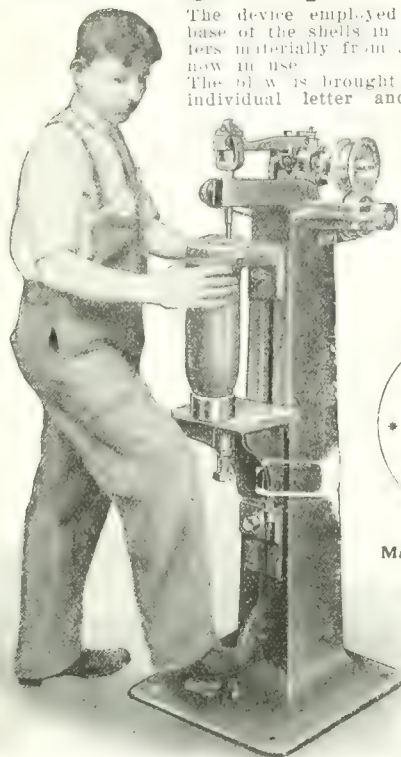
Duncan Electrical Co., Montreal.  
Geometric Tool Co., New Haven.  
Greenfield Tap & Die Corporation, Greenfield, Mass.  
Landis Machine Co., Waynesboro, Pa.  
Matthews, J. H., & Co., Pittsburg, Pa.

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## Marking High Explosive Shells



The device employed in marking the base of the shells in this machine differs materially from any other method now in use.

The blow is brought to bear on each individual letter and figure successively and with absolute uniformity.

Adjustable to give shallow or deep impression. FIFTEEN SECONDS' TIME for marking perfectly one Shell. For 18-pound, 45 and 60-pound Shells.

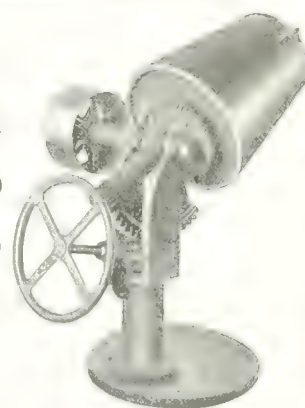


Cut Showing Marking on Shell

Full Particulars on Request.

The Grant Mfg. & Machine Company  
Bridgeport, Conn.

## Make One Barrel Do What Two Barrels Did Before



THE minute you install one Globe Tumbling Barrel, you can pension two of your old-fashioned horizontal barrels and still do a wider variety of work, and do it a great deal better and many times faster.

### GLOBE TUMBLING BARRELS

save time because they don't have to be stopped for filling, emptying or inspecting of the work. They save floor space, because they stand vertically and occupy little room, and they save money, because they require a smaller investment in barrels.

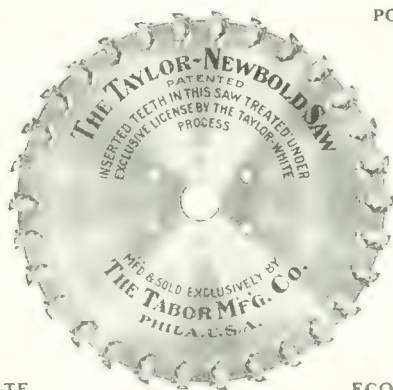
Eight stock sizes, \$50 to \$170. Our Booklet contains useful information on tumbling—shows the different styles of Globe Barrels and tells what each will do. Write for a free copy to-day.

The Globe Machine & Stamping Co.  
Cleveland, Ohio, U.S.A.

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FAST

POWERFUL



ACCURATE

ECONOMICAL

## COLD SAWS

WITH INSERTED TEETH OF SOLID HIGH-SPEED STEEL, TREATED UNDER FULL TAYLOR-WHITE PROCESS.

Stand Pre-eminent!

Send For Saw Bulletin.

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PHILADELPHIA, PA., U. S. A.



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SHELL MANUFACTURERS use ECONOMIC QUENCHING and TEMPERING OILS.

They are MONEY SAVERS and we guarantee immediate delivery.

Made in Canada

Canadian Economic Lubricant Co.  
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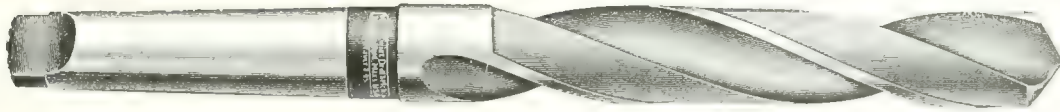
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A. B. Jardine & Co., Hespeler, Ont.  
Lamb Machine Co., Waynesboro, Pa.  
MacGraw, J. H., & Co., Pittsburgh, Pa.  
Modern Tool Co., Erie, Pa.  
Mortney Machine & Tool Co., Detroit.  
Pratt & Whitney Co., Dundas, Ont.
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Wells Brothers Co., Greenfield, Mass.
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Brown, Boggs & Co., Hamilton, Can.
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Hull, Chase & Co. of Chicago, Chicago, Ill.  
Garvin Machine Co., New York.  
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Girard Machine & Tool Co., Philadelphia, Pa.  
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Can. Fairbanks-Morse Co., Montreal.  
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Pratt & Whitney Co., Dundas, Ont.  
Niles-Bement-Pond Co., New York.
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Morse Twist Drill and Machine Co., New Bedford.
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Can. Fairbanks-Morse Co., Montreal.  
Cleveland Twist Drill Co., Cleveland, O.  
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Morse Twist Drill and Machine Co., New Bedford.  
H. W. Petrie, Toronto.  
Pratt & Whitney Co., Dundas, Ont.  
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ALWAYS DO. THEY PERFORM THE DUTY FOR WHICH THEY ARE DESIGNED AND THEY KEEP ON DOING IT, WHICH MEANS SERVICE. IF YOU ARE LOOKING FOR STEADY, DEPENDABLE RESULTS, USE "MORSE" DRILLS EVERY TIME.

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NEW BEDFORD MASS.

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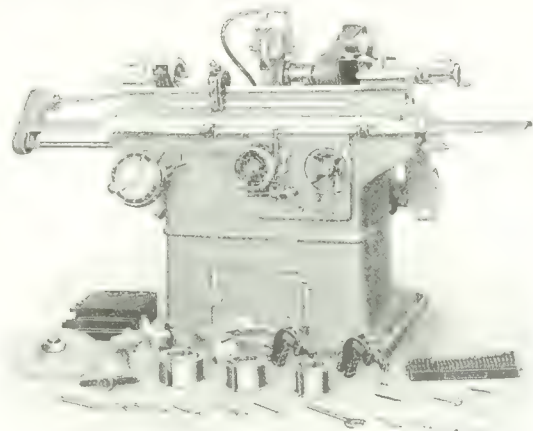
Nobody is satisfied unless the operator keeps up to produce top demands. But to do this and keep up the pace he must have a satisfactory machine which is easy to set up, hardy to operate, and will hold work within close limits without constant resetting. Ask any good operator's opinion of B. & S. Plain Grinding Machines.

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is their slogan. So they like these machines because of their handy, sure, perfect qualities. Because they can be sure a job is done under favorable conditions every time—the right speed and the right feed instantly available—you will find many favoring B. & S. Machines in the list of new equipment.

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An efficient machine and a satisfied operator are very sure to keep the cost per piece where it belongs—the point which interests the factory executive. It's doubly satisfying when design, materials and workmanship are such that depreciation is at minimum and those repair bills few and small.



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Capacities: 6" x 20" and 6" x 32".

Single Pulley Constant Speed Drive, a self-contained Machine Constant Speed Motor can be applied at any time. Work speed and table feed drives, independent, smooth, powerful. Any rate from fastest to slowest instantly obtained while running. Cross Feed automatically sizes work, instantly set. Universal Back Rests correctly support slender, or splined work.

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**Gas Producer Plants.**

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National Machinery & Supply Co., Hamilton.  
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Philadelphia Gear Works, Philadelphia, Pa.  
Smart-Turner Machine Co., Hamilton, Ont.  
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Niles-Bement-Pond Co., New York.

Modern Tool Co., Erie, Pa.

Morse Twist Drill and Machine Co., New Bedford.

New Britain Machine Co., New Britain, Conn.

Norton Grinding Co., Worcester, Mass.

H. W. Petrie, Toronto.

Stow Mfg. Co., Binghamton, N.Y.

United States Electrical Tool Co., Cincinnati, O.

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Brown & Sharpe Mfg. Co., Providence, R.I.

Foss & Hill Machy. Co., Montreal.

Greenfield Machine Co., Greenfield, Mass.

H. W. Petrie, Toronto.

Pratt & Whitney Co., Dundas, Ont.

**Grinders, Die Chaser.**

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Landis Machine Co., Waynesboro, Pa.

Modern Tool Co., Erie, Pa.

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Armstrong Bros. Tool Co., Chicago, Ill.

Gardner Machine Co., Beloit, Wis.

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Greenfield Machine Co., Greenfield, Mass.

Hill, Clarke & Co. of Chicago, Chicago, Ill.

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Modern Tool Co., Erie, Pa.

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**Grinders, Portable, Electric.**

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United States Electrical Tool Co., Cincinnati.

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W. F. & John Barnes Co., Rockford, Ill.

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Greenfield Machine Co., Greenfield, Mass.

Hill, Clarke & Co. of Chicago, Chicago, Ill.

Mote & Merryweather Machy. Co., Cleveland, O.

Tabor Mfg. Co., Philadelphia, Pa.

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Modern Tool Co., Erie, Pa.

**Grinders, Vertical Surface.**

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Hall & Sons, John H., Brantford.

Hill, Clarke & Co. of Chicago, Chicago, Ill.

Mote & Merryweather Machy. Co., Cleveland, O.

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West Tire Setter Co., Rochester, N.Y.

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**Hammers, Steam.**

John Bertram & Sons Co., Dundas.

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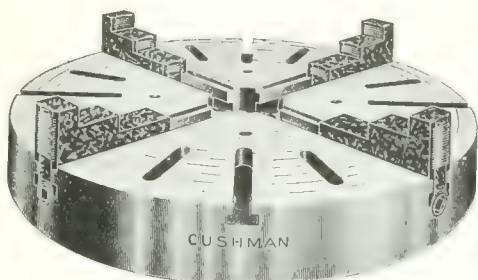
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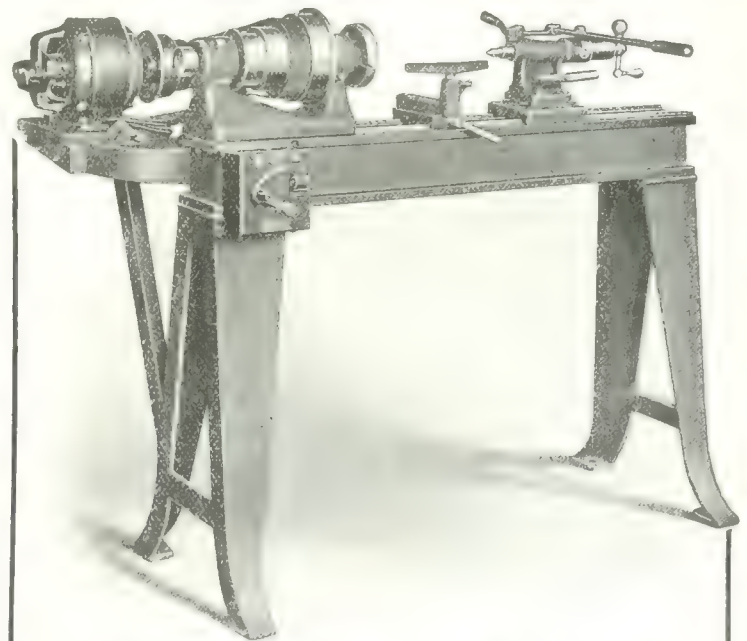
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The lathe spindle is made from high carbon steel, ground to size, and running in self-oiling bronze bearings. The tailstock has screw and lever feed. The bed is cross-rail and all clamping members are made of steel.

**J. G. BLOUNT CO. - Everett, Mass., U.S.A.**

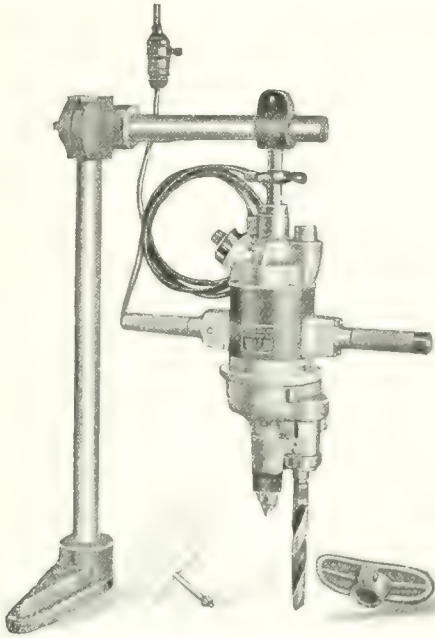
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Pattern Shop Equipment, Guelph, Ont.  
Oliver Machinery Co., Grand Rapids, Mich.
- Perforated Metals and Ornamental Iron Goods.**  
Canada Wire & Iron Goods Co., Hamilton.
- Phosphor Bronze Castings.**  
Taffman Brass & Metal Co., Hamilton.
- Pickling Machines.**  
Mesta Machine Co., Pittsburgh.
- Pig Iron.**  
Hanna & Co., M. A., Cleveland, O.  
Steel Co. of Canada, Hamilton, Ont.  
Sterns, P. B., Detroit, Mich.
- Pinions, Mill Cut.**  
Mesta Machine Co., Pittsburgh, Pa.  
Wm. Todd Co., Youngstown, O.



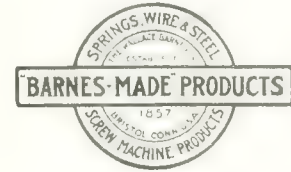
## Stow Two Speed Two Spindle Drill



The only tool of its kind on the market. Fills a long-felt want. Will cut your cost.

We make drills of every size.

**STOW MFG. CO., Binghamton, N.Y., U.S.A.**  
**London, England, Stock: 85 Queen Victoria Street**  
 Oldest Portable Tool Manufacturers in America.



## SPECIAL SPRINGS

AND

## Screw Machine Products

MADE ON CONTRACT

to the most exacting specifications,  
and deliveries made as desired.

Ask for Booklet 6-T.

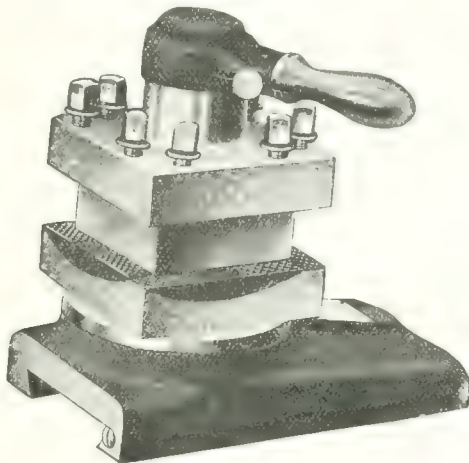
Established 1857  
**THE WALLACE BARNES COMPANY**  
 128 SOUTH STREET BRISTOL, CONN., U.S.A.  
 Makers of "Barnes-made" Products  
 Springs, Screw Machine Products, Cold Rolled Steel and Wire

## Making SHRAPNEL ?

Here is Standard Equipment

The Fay & Scott turret tool post shown here is being universally adopted as standard equipment for the manufacture of shrapnel.

The square head turret, style G, is used for turning the outside of the shell. We have made these turrets for years, and can fit them to any make or size of lathe, old or new.



Style G

Catalog and full details on request

**Fay & Scott, Dexter, Me.**

## 16 in. Lever POST DRILL

A Giant Little Machine  
For Light Drilling.

Will drill up to  $\frac{7}{8}$  inch.

The Feed Lever Socket is adjustable on the feed shaft, to provide for setting the lever in the most convenient position for the operator.

An adjustment friction is provided for the feed shaft, which acts as a balance to the weight of the spindle.

Bevel Gears, Feed Pinion and Rack are all machine cut, working smoothly and without noise.

Drills to centre of 16-inch circle.

Run of feed  $\frac{5}{16}$  inches.

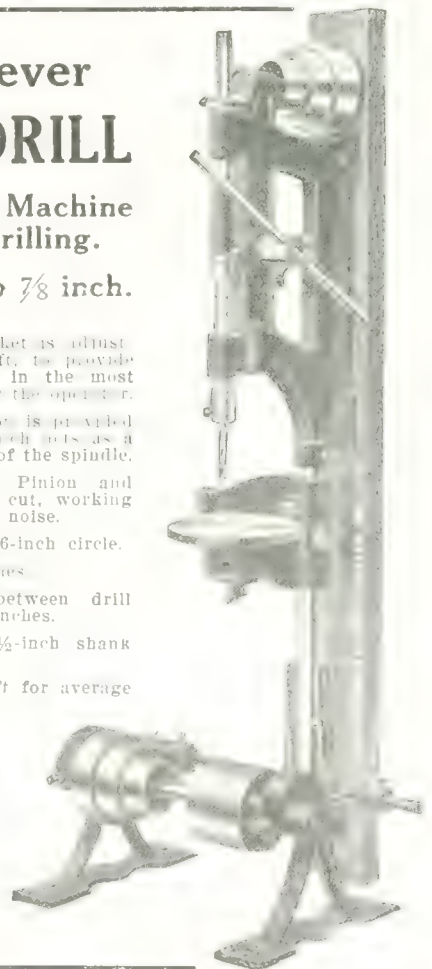
Greatest distance between drill spindle and table, 23 inches.

Spindle bored for  $\frac{1}{2}$ -inch shank twist drills.

Speed of countershaft for average work, 300 per minute.

**A. B. Jardine  
& Co.**

Hespeler, Ontario



*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*



**Pipe Cutting and Threading Machines.**

A. R. Williams Machy. Co., Toronto.  
Armstrong Mfg. Co., Bridgeport, Conn.  
Signal & Keeler Mfg. Co., Edwardsville, Ill.

Butterfield & Co., Rock Island, Que.  
Can. Fairbanks-Morse Co., Montreal.  
Foss & Hill Machy. Co., Montreal.  
Garvin Machine Co., New York.  
Girard Machine & Tool Co., Philadelphia, Pa.

John H. Hall & Sons, Brantford.  
A. B. Jardine & Co., Hespeler, Ont.  
Landis Machine Co., Waynesboro, Pa.  
R. McDougall Co., Galt.  
H. W. Pettie, Toronto.

Triment Mfg. Co., Roxbury, Mass.  
Williams Tool Co., Erie, Pa.

**Pipe Cutters, Rolling.**

Armstrong Mfg. Co., Bridgeport, Conn.  
Signal & Keeler Mfg. Co., Edwardsville, Ill.

John H. Hall & Sons, Ltd., Brantford, Ont.

**Pipe Fittings.**

Southwark Foundry & Machine Co., Philadelphia.

**Pipe, Riveted Steel.**

Toronto Iron Works, Ltd., Toronto.

**Pipe Straightening Machines.**

Watson-Stillman Co., Aldene, N.J.

**Planer Drives, Electrical.**

Lancashire Dynamo & Motor Co., Ltd., Toronto.

**Planer Jacks.**

Armstrong Bros. Tool Co., Chicago.

**Planers, Standard and Rotary.**

John Bertram & Sons Co., Dundas.  
Can. Fairbanks-Morse Co., Montreal.  
Foss & Hill Machy. Co., Montreal.  
Gardner, Robt., & Son, Montreal.  
Garvin Machine Co., New York.  
Girard Machine & Tool Co., Philadelphia, Pa.

Morton Mfg. Co., Muskegon Heights, Mich.  
Niles-Bement-Pond Co., New York.

**Planing Mills.**

H. W. Pettie, Toronto.

**Planing and Shaping Machinery.**

A. R. Williams Machy. Co., Toronto.  
Can. Fairbanks-Morse Co., Montreal.  
Fay & Scott, Dexter, Maine.  
Foss & Hill Machy. Co., Montreal.  
Garvin Machine Co., New York.  
Niles-Bement-Pond Co., New York.  
H. W. Pettie, Toronto.

**Planing Mill Exhausters.**

Can. Buffalo Forge Co., Montreal.  
Sheldons, Ltd., Galt, Ont.

**Pliers.**

Canadian Billings & Spencer, Ltd., Welland.

**Pneumatic Tools.**

Cleveland Pneumatic Tool Co. of Canada, Toronto.  
Curtis Pneumatic Machinery Co., St. Louis, Mo.  
Independent Pneumatic Tool Co., Chicago, New York.

**Polishing Machines, Electric and Band.**

Can. H. W. Johns-Manville Co., Toronto.

**Portable Vise Stands.**

New Britain Machine Co., New Britain, Conn.

**Portable Steel Tool Racks.**

New Britain Machine Co., New Britain, Conn.

**Portable Steel Work Stands.**

New Britain Machine Co., New Britain, Conn.

**Power Plant Equipments.**

Can. Fairbanks-Morse Co., Montreal.  
Power Transmission.

Mesta Machine Co., Pittsburgh, Pa.  
The Smart-Turner Mach. Co., Hamilton.

**Press Screw (Adjustable).**

W. F. & John Barnes Co., Rockford.  
Wm. R. Perrin, Ltd., Toronto.

**Presses, Bench Straightening.**

Toledo Machine & Tool Co., Toledo.

**Presses for Shells.**

Can. Boomer & Boschert Press Co., Montreal.

Can. Locomotive Co., Kingston, Ont.  
Wm. Cramp & Sons Ship & Engine Building Co., Philadelphia, Pa.

Charles F. Elmes Eng. Works, Chicago.  
Foss & Hill Machy. Co., Montreal.  
Goldie & McCulloch Co., Galt, Ont.  
Mesta Machine Co., Pittsburgh.  
William R. Perrin, Ltd., Toronto.  
H. W. Pettie, Toronto.

Southwark Foundry & Machine Co., Philadelphia, Pa.

Wm. Tod Company, Youngstown, O.  
Watson-Stillman Co., Aldene, N.J.  
West Tire Setter Co., Rochester, N.Y.  
Wood R. D. & Co., Philadelphia.

**Presses, Cam, Toggle, Etc.**

Baird Machine Co., Bridgeport, Conn.  
Toledo Machine & Tool Co., Toledo, O.

**Presses, Branching.**

E. W. Bliss Co., Brooklyn, N.Y.  
Toledo Machine & Tool Co., Toledo.

Watson-Stillman Co., Aldene, N.J.

**Presses, Deep.**

A. H. Randfield & Son, Toronto.  
E. W. Bliss Co., Brooklyn, N.Y.  
Brown, Boggs Co., Ltd., Hamilton, Canada.

Can. Boomer & Boschert Press Co., Montreal.

Niles-Bement-Pond Co., New York.  
William R. Perrin, Ltd., Toronto.

Toledo Machine & Tool Co., Toledo.  
Watson-Stillman Co., Aldene, N.J.

**Presses, Filter.**

Lymburner, Ltd., Montreal.  
Wm. R. Perrin, Ltd., Toronto.

**Presses, Forging.**

Can. Boomer & Boschert Press Co., Montreal.

E. W. Bliss Co., Brooklyn, N.Y.  
Brown, Boggs Co., Ltd., Hamilton, Canada.

Wm. Cramp & Sons Ship & Engine Building Co., Philadelphia, Pa.  
Charles F. Elmes Eng. Works, Chicago, Ill.

Can. Fairbanks-Morse Co., Montreal.  
Girard Machine & Tool Co., Philadelphia, Pa.

Mesta Machine Co., Pittsburgh, Pa.  
Niles-Bement-Pond Co., New York.

Wm. R. Perrin, Ltd., Toronto.  
H. W. Pettie, Toronto.

Southwark Foundry & Machine Co., Philadelphia, Pa.

Wm. Tod Co., Youngstown, O.  
Toledo Machine & Tool Co., Toledo.

Watson-Stillman Co., Aldene, N.J.

**Presses, Hydraulic.**

Can. Boomer & Boschert Press Co., Montreal.

Wm. Cramp & Sons Ship & Engine Building Co., Philadelphia, Pa.

A. R. Williams Machy. Co., Toronto.  
John Bertram & Sons Co., Dundas.

Charles F. Elmes Eng. Works, Chicago, Ill.

Mesta Machine Co., Pittsburgh, Pa.  
Niles-Bement-Pond Co., New York.

William R. Perrin, Ltd., Toronto.  
Southwark Foundry & Machine Co., Philadelphia, Pa.

Wm. Tod Company, Youngstown, O.  
H. W. Pettie, Toronto.

Toledo Machine & Tool Co., Toledo.  
Watson-Stillman Co., Aldene, N.J.

Wood, R. D. & Co., Philadelphia.

**Presses, Pneumatic.**

Toledo Machine & Tool Co., Toledo.

**Presses, Power.**

Baird Machine Co., Bridgeport, Conn.

Can. Boomer & Boschert Press Co., Montreal.

E. W. Bliss Co., Brooklyn, N.Y.  
Brown, Boggs Co., Ltd., Hamilton, Canada.

Can. Fairbanks-Morse Co., Montreal.  
Charles F. Elmes Eng. Works, Chicago, Ill.

Geo. Gorton Machine Co., Racine.  
Girard Machine & Tool Co., Philadelphia, Pa.

William R. Perrin, Ltd., Toronto.  
H. W. Pettie, Toronto.

Southwark Foundry & Machine Co., Philadelphia, Pa.

Toledo Machine & Tool Co., Toledo.  
Watson-Stillman Co., Aldene, N.J.

A. R. Williams Machy. Co., Toronto.

**Presses, Scrap Baling.**

Can. Boomer & Boschert Press Co., Montreal.

William R. Perrin, Ltd., Toronto.

Watson-Stillman Co., Aldene, N.J.

**Presses, Spring Foot.**

Baird Machine Co., Bridgeport, Conn.

Toledo Machine & Tool Co., Toledo.

Brown, Boggs & Co., Hamilton, Can.

**Presses, Screw.**

Can. Boomer & Boschert Press Co., Montreal.

Wm. R. Perrin, Ltd., Toronto.

**Pressure Regulators.**

Can. Fairbanks-Morse Co., Montreal.

**Protective Paint.**

Jos. Dixon Crucible Co., Jersey City.

**Pulleys.**

American Pulley Co., Philadelphia, Pa.

Baird Machine Co., Bridgeport, Conn.

Brown & Sharpe Mfg. Co., Providence, R.I.

Can. Fairbanks-Morse Co., Montreal.

General Supply Co. of Canada, Ltd., Ottawa.

D. K. McLaren, Ltd., Montreal.

H. W. Pettie, Toronto.

Positive Clutch & Pulley Works, Ltd., Toronto.

The Smart-Turner Mach. Co., Hamilton.

A. R. Williams Machy. Co., Toronto.

Can. Fairbanks-Morse Co., Montreal.

Can. Fairbanks-Morse Co., Montreal.

Darling Brothers, Montreal.

D'Olier Centrifugal Pump & Mach. Co., Philadelphia, Pa.

National Mach. & Sup. Co., Hamilton.

Wm. R. Perrin Co., Toronto.

H. W. Pettie, Toronto.

The Smart-Turner Mach. Co., Hamilton.

Southwark Foundry & Machine Co., Philadelphia.

Wm. Tod Company, Youngstown, O.

**Pumps, all Kinds.**

Can. Buffalo Forge Co., Montreal.

Charles F. Elmes Eng. Works, Chicago.

Darling Brothers, Montreal.

General Supply Co. of Canada, Ltd., Ottawa.

Owen Sound Iron Works Co., Owen Sound.

William R. Perrin, Ltd., Toronto.

H. W. Pettie, Toronto.

The Smart-Turner Mach. Co., Hamilton.

A. R. Williams Machy. Co., Toronto.

Watson-Stillman Co., Aldene, N.J.

**Pumps, Electrically Driven.**

D'Olier Centrifugal Pump & Mach. Co., Philadelphia, Pa.

The Smart-Turner Mach. Co., Hamilton.

**Pumps, Hydraulic.**

Can. Boomer & Boschert Press Co., Montreal.

Charles F. Elmes Eng. Works, Chicago, Ill.

Darling Brothers, Montreal.

Smart-Turner Mach. Co., Hamilton.

Wm. R. Perrin, Ltd., Toronto.

Wm. Tod Co., Youngstown, O.

Watson-Stillman Co., Aldene, N.J.

**Pumps for Oiling Systems.**

S. F. Bowser & Co., Fort Wayne, Ind.

**Pumps, Steam.**

Darling Brothers, Montreal.

Smart-Turner Mach. Co., Hamilton.

Wm. Tod Company, Youngstown, O.

**Pump Leathers.**

Graton & Knight Mfg. Co., Montreal.

Southwark Foundry & Machine Co., Philadelphia.

**Punches and Dies.**

W. H. Randfield & Sons, Toronto.

E. W. Bliss Co., Brooklyn, N.Y.

Brown, Boggs Co., Ltd., Hamilton, Canada.

Can. Buffalo Forge Co., Montreal.

Can. Fairbanks-Morse Co., Montreal.

Scott Bros., Halifax, Eng.

Gardner, Robt., & Son, Montreal.

Globe Machine & Stamping Co., A. B. Jardine & Co., Hespeler, Ont.

H. W. Pettie, Toronto.

Pratt & Whitney Co., Dundas, Ont.

Toledo Machine & Tool Co., Toledo, O.

**Punches, Power.**

John Bertram & Sons Co., Dundas.

Bliss, E. W., Co., Brooklyn, N.Y.

Brown, Boggs Co., Ltd., Hamilton, Canada.

Girard Machine & Tool Co., Philadelphia, Pa.

Niles-Bement-Pond Co., New York.

Watson-Stillman Co., Aldene, N.J.

**Punches, Pneumatic.**

Jno. F. Allen Co., New York.

**Punching Machines, Horizontal.**

Bertrams, Ltd., Edinburgh, Scotland.

John Bertram & Sons Co., Dundas.

Bliss, E. W., Co., Brooklyn, N.Y.

Brown, Boggs Co., Ltd., Hamilton, Canada.

Long & Alstatter Co., Hamilton, Ohio.

Niles-Bement-Pond Co., New York.

Williams, White & Co., Mahone, Ill.

**Pyrometers.**

Canadian Hoskins, Limited, Walkerville, Ont.

Shore Instrument & Mfg. Co., New York City.

Thwing Instrument Co., Philadelphia, Pa.

Quartering Machines.

John Bertram & Sons Co., Dundas.

Niles-Bement-Pond Co., New York.

Ratchet Wrenches.

Wells Brothers Co., Greenfield, Mass.

Railing, Iron and Brass.

Canada Wire & Iron Goods Co., Hamilton, Ont.

Dennis Wire & Iron Works Co., Ltd., London, Canada.

Rail Benders.

Niles-Bement-Pond Co., New York.

Railroad Tools.

Can. Fairbanks-Morse Co., Montreal.

Niles-Bement-Pond Co., New York.

Railroad Tools, Hydraulic.

Watson-Stillman Co., Aldene, N.J.

Rapping Plates.

Stevens, F. B., Detroit, Mich.

Ratchets.

Keystone Mfg. Co., Buffalo, N.Y.

Raw Hide Pinions.

Gardner, Robt., & Son, Montreal.

Hamilton Gear & Machine Co., Toronto.

Jones & Glascock, Montreal.

Smart-Turner Machine Co., Hamilton, Ont.

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Can. Fairbanks-Morse Co., Montreal.

Cleveland Twist Drill Co., Cleveland.

Morse Twist Drill & Machine Co., New Bedford.

Pratt & Whitney Co., Dundas, Ont.

Wells Brothers Co., Greenfield, Mass.

**Reamers, Bridge, Expanding and High Speed.**

Butterfield & Co., Rock Island, Que.

Can. Fairbanks-Morse Co., Montreal.

Cleveland Twist Drill Co., Cleveland.

McKenna Bros. Brass Co., Pittsburgh, Pa.

Morse Twist Drill & Machine Co., New Bedford.

Pratt & Whitney Co., Dundas, Ont.

H. W. Pettie, Toronto.

Pratt & Whitney Co., Dundas, Ont.

**Reamer Fluting Machines.**

Garvin Machine Co., New York.

**Reamers, Pipe, Cylinder and Locomotive.**

Butterfield & Co., Rock Island, Que.

Can. Fairbanks-Morse Co., Montreal.

Cleveland Twist Drill Co., Cleveland.

Morse Twist Drill & Machine Co., New Bedford.

H. W. Pettie, Toronto.

Pratt & Whitney Co., Dundas, Ont.

Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

**Reaming Machines, Pneumatic.**

Cleveland Pneumatic Tool Co. of Canada, Toronto.

Independent Pneumatic Tool Co., Chicago.

**Reamers, Steel Taper and Self-Feeding.**

Butterfield & Co., Rock Island, Que.

Can. Fairbanks-Morse Co.,



*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*



- Sand Blast Systems.**  
Whiting Foundry Equipment Co., Harvey, Ill.
- Saw Blades.**  
Diamond Saw & Stamping Works, Buffalo, N.Y.
- Sanding Machines.**  
Chas. Munro & Co., Great Rapids, Mich.
- Saw Tables.**  
Hub Machine Welding & Contracting Co., Philadelphia, Pa.
- Saw Sharpening Machines.**  
Nutter & Barnes Co., Hinsdale, N.H.
- Saw Mill Machinery.**  
A. R. Williams Machy. Co., Toronto  
Can. Fairbanks-Morse Co., Montreal  
Eschen-Lucas Mach. Works, Philadelphia, Pa.
- Gardner, Robt. & Son, Montreal.**  
Girard Machine & Tool Co., Philadelphia, Pa.  
Hendey Machine Co., Torrington, Ct.  
Hill, Clarke & Co., of Chicago, Chicago, Ill.  
H. W. Petrie, Toronto.
- Shafting.**  
A. R. Williams Machy. Co., Toronto.  
Can. Fairbanks-Morse Co., Montreal.  
Mesta Machine Co., Pittsburgh, Pa.  
Niles-Bement-Pond Co., New York.  
H. W. Petrie, Toronto.  
Pratt & Whitney Co., Dundas, Ont.
- Sharpening Stones.**  
Carborundum Co., Niagara Falls, N.Y.  
Norton Co., Worcester, Mass.
- Shavings, Separators.**  
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- Shearing Machines, Angle Iron, Bar and Gate.**  
John Bertram & Sons Co., Dundas.  
Bertrams, Ltd., Edinburgh, Scotland.  
Girard Machine & Tool Co., Philadelphia, Pa.  
A. B. Jardine & Co., Hespeler, Long & Alstetter, Hamilton, Ohio.  
Mesta Machine Co., Pittsburgh, Pa.  
Niles-Bement-Pond Co., New York.  
Scott Bros., Halifax, Eng.  
Toledo Machine & Tool Co., Toledo.  
Williams, White & Co., Moline, Ill.
- Shears, Power.**  
John Bertram & Sons Co., Dundas.  
Rliss, E. W. Co., Brooklyn, N.Y.  
Brown Boggs Co., Ltd., Hamilton, Canada.  
Buffalo Forge Co., Buffalo, N.Y.  
Girard Machine & Tool Co., Philadelphia, Pa.  
Mesta Machine Co., Pittsburgh, Pa.  
National Machy. Co., Tiffin, Ohio.  
National Mach. & Sup. Co., Hamilton.  
Niles-Bement-Pond Co., New York.  
Scott Bros., Halifax, Eng.  
H. W. Petrie, Toronto.  
Toledo Machine & Tool Co., Toledo, Ohio.
- Shears, Lever, Hydraulic.**  
Mesta Machine Co., Pittsburgh, Pa.  
Watson-Stillman Co., Aldene, N.J.
- Shears, Pneumatic.**  
John F. Allen Co., New York.  
Toledo Machine & Tool Co., Toledo, Ohio.
- Shears, Squaring.**  
Brown, Boggs & Co., Hamilton, Can.
- Sheet Metal Working Tools.**  
Baird Machine Co., Bridgeport, Conn.  
Rliss, E. W. Co., Brooklyn, N.Y.  
Brown, Boggs & Co., Hamilton, Can.  
Steel Bending Brake Works, Ltd., Chatham, Ont.
- Sheet Metal Stampings.**  
Duncan Electrical Co., Montreal.
- Shell Bending Machines, Hydraulic.**  
Wm. Cramp & Sons Ship & Engine Bldg. Co., Philadelphia, Pa.  
Can. Locomotive Co., Kingston, Ont.  
Goldie & McCulloch Co., Galt, Ont.  
Inglis, Ltd., Montreal.  
Metcalf & Merryweather Machy. Co., Cleveland, O.  
Watson-Stillman Co., Aldene, N.J.  
West Tire Setter Co., Rochester, N.Y.
- Shell Hoisting Machinery.**  
Beath, W. D. & Son, Toronto.
- Shell Lathes.**  
Barnett Machine Tool Co., Meadville, Pa.  
Garlock-Machinery, Toronto.  
Jencks Machine Co., Sherbrooke, Que.  
Kellogg & Co., Toronto.  
H. W. Petrie, Toronto.
- Shell Manufacturing Tools.**  
Amalgamated Machinery Corporation, Chicago, Ill.  
Frank Tommer, Inc., Philadelphia, Pa.  
Garlock-Machinery, Toronto.  
New York Machinery Exchange, New York.  
Hill, Clarke & Co. of Chicago, Chicago, Ill.  
A. B. Jardine & Co., Hespeler, Metch & Merryweather Machy. Co., Cleveland, O.  
National Mach. & Sup. Co., Hamilton.  
New Britain Machine Co., New Britain, Conn.  
H. W. Petrie, Toronto.  
Pratt & Whitney Co., Dundas, Ont.  
Warner & Swasey Co., Cleveland, O.  
A. R. Williams Machy. Co., Toronto.  
Windsor Machine Co., Windsor, Vt.
- Screw Machines, Multiple Spindle.**  
New Britain Machine Co., New Britain, Conn.  
Windsor Machine Co., Windsor, Vt.
- Screw Plates.**  
Butterfield & Co., Rock Island, Que.  
Can. Tap & Die Co., Galt, Ont.  
A. B. Jardine & Co., Hespeler.  
Morse Twist Drill & Machine Co., New Bedford.  
Wells Brothers Co., Greenfield, Mass.  
Wiley & Russell Co., Greenfield, Mass.
- Screw Slotters.**  
Garvin Machine Co., New York.  
Pratt & Whitney Co., Dundas, Ont.
- Set Screws, Safety.**  
Allen Mfg. Co., Hartford, Conn.
- Second-Hand Machinery.**  
New York Machinery Co., New York.  
Gardner, Robt. & Son, Montreal.  
Can. Drawn Steel Co., Hamilton, Ont.  
Gardner, Robt. & Son, Montreal.  
National Mach. & Sup. Co., Hamilton.  
Niles-Bement-Pond Co., New York.  
H. W. Petrie, Toronto.  
Pleissville Foundry, Pleissville, Que.  
The Smart-Turner Machine Co., Hamilton.  
Union Drawn Steel Co., Hamilton.
- Shanks, Straight and Taper.**  
Jacobs Mfg. Co., Hartford, Conn.
- Shapers.**  
John Bertram & Sons Co., Dundas.  
Can. Fairbanks-Morse Co., Montreal.  
Canada Machy. Corp., Galt, Ont.  
Euse & Hill Machy. Co., Montreal.
- Silver Solder.**  
Geo. H. Lees & Co., Ltd., Hamilton, Ont.
- Slotters.**  
Garvin Machine Co., New York.  
Niles-Bement-Pond Co., New York.
- Smokestacks.**  
MacKinnon, Holmes Co., Sherbrooke, Que.
- Pleissville Foundry, Pleissville, Que.**  
Brown & Sharpe Mfg. Co., Providence, R.I.  
Cleveland Twist Drill Co., Cleveland.  
Keystone Mfg. Co., Buffalo, N.Y.  
Modern Tool Co., Erie, Pa.  
Morse Twist Drill & Machine Co., New Bedford.  
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.  
Whitman & Barnes Mfg. Co., St. Catharines, Ont.  
J. H. Williams Co., Brooklyn, N.Y.
- Soldering Irons.**  
Brown, Boggs & Co., Hamilton, Can.
- Solders.**  
Tallman Brass & Metal Co., Hamilton.
- Specialties, Electric.**  
Lintz-Porter Co., Toronto.
- Special Machinery.**  
Armstrong Bros., Toronto.  
V. H. Banfield & Sons, Toronto.  
John Bertram & Sons Co., Dundas.  
Baird Machine Co., Bridgeport, Conn.  
Bliss, E. W. Co., Brooklyn, N.Y.  
Brown, Boggs & Co., Hamilton, Can.  
Can. Fairbanks-Morse Co., Montreal.  
Canada Machy. Agency, Montreal.  
Cunningham & Sons, St. Catharines, Ont.  
Charles F. Elmes Eng. Works, Chicago.  
Ford-Smith Machine Co., Hamilton.  
Garvin Machine Co., New York.
- Gooley & Edmund, Inc., Courtland, N.Y.**  
Grant Mfg. & Machy. Co., Bridgeport, Conn.  
John H. Hall & Sons, Brantford.  
Jardine, A. B. & Co., Hespeler.  
National Electric Welder Co., Warren, Ohio.  
National Forge & Tool Co., Erie, Pa.  
National Mach. & Sup. Co., Hamilton.  
Pleissville Foundry, Pleissville, Que.  
Smart-Turner Machine Co., Hamilton, Ont.  
William R. Perrin, Ltd., Toronto.  
Wm. Tod Company, Youngstown, O.
- Spike Machines.**  
The Smart-Turner Machine Co., Hamilton.
- Spring Collars.**  
Baird Machine Co., Bridgeport, Conn.  
Garvin Machine Co., New York.
- Springs, Machinery.**  
Cleveland Wire Spring Co., Cleveland.  
Jas. Steele, Ltd., Guelph, Ont.  
Wallace, Barnes Co., Bristol, Conn.
- Spring Making Machinery (Automatic).**  
Baird Machine Co., Bridgeport, Conn.
- Sprockets, Chain.**  
Morse Chain Co., Ithaca, N.Y.  
Philadelphia Gear Works, Philadelphia, Pa.
- Stairs, Iron.**  
Canada Wire & Iron Goods Co., Hamilton, Ont.  
Dennis Wire & Iron Works Co., Ltd., London, Canada.
- Stamping.**  
Duncan Electrical Co., Montreal.
- Stamping Machinery.**  
Brown, Boggs & Co., Hamilton, Can.
- Stationary Ladders.**  
New Britain Machine Co., New Britain, Conn.
- Steam Specialties.**  
General Supply Co. of Canada, Ltd., Ottawa.  
Sheldons, Ltd., Galt, Ont.
- Steam Separators and Traps.**  
Can. Fairbanks-Morse Co., Montreal.  
Can. Sirocco Co., Ltd., Windsor, Ont.  
H. W. Petrie, Toronto.  
Sheldons, Ltd., Galt, Ont.  
The Smart-Turner Machine Co., Hamilton.
- Steel Alloy.**  
Vanadium Alloys Steel Co., Pittsburgh, Pa.  
Vulcan Crucible Steel Co., Alliquippa, Pa.
- Steel Chains for Pulp Mill and Saw Mill.**  
Pleissville Foundry, Pleissville, Que.
- Steel Barrels.**  
Smart-Turner Machine Co., Hamilton, Ont.
- Steel Bench Legs.**  
New Britain Machine Co., New Britain, Conn.
- Steel Bending Brakes.**  
Steel Bending Brake Works, Ltd., Chatham, Ont.
- Steel, Cold Rolled.**  
Can. Drawn Steel Co., Hamilton, Ont.  
A. C. Leslie & Co., Ltd., Montreal.  
Union Drawn Steel Co., Hamilton, Ont.  
Wallace, Barnes Co., Bristol, Conn.
- Steel Drums.**  
Smart-Turner Machine Co., Hamilton, Ont.
- Steel Pressure Blowers.**  
Can. Buffalo Forge Co., Montreal.  
Can. Fairbanks-Morse Co., Montreal.
- Steel, all kinds.**  
Lackawanna Steel Co., Lackawanna, N.Y.
- Steel, High Speed.**  
Armstrong Whitworth of Canada, Ltd., Montreal.  
Can. Fairbanks-Morse Co., Montreal.  
H. A. Drury Co., Ltd., Montreal.  
Thos. Firth & Sons, Montreal.  
Hawkrige Bros. Co., Boston, Mass.  
National Mach. & Sup. Co., Hamilton.  
H. W. Petrie, Toronto.  
Vanadium Alloys Steel Co., Pittsburgh, Pa.  
Vulcan Crucible Steel Co., Alliquippa, Pa.
- Steel Die Engraving.**  
Noble & Westbrook Mfg. Co., Hartford, Conn.
- Steel Machinery.**  
Hawkrige Bros. Co., Boston, Mass.
- Steel Vanadium.**  
Vanadium Alloys Steel Co., Pittsburgh, Pa.  
Vulcan Crucible Steel Co., Alliquippa, Pa.
- Stock Racks for Bars, Piping, Etc.**  
New Britain Machine Co., New Britain, Conn.
- Stocks for Dies.**  
Wells Bros. Co., Greenfield, Mass.
- Stocks, Pipe.**  
Butterfield & Co., Rock Island, Que.  
Greenfield Tap & Die Corporation, Greenfield, Mass.
- Stools, Steel, Shop.**  
Dennis Wire & Iron Works Co., Ltd., London, Canada.
- Storage Systems.**  
S. F. Bowser & Co., Fort Wayne, Ind.
- Stoves, Electric.**  
Lintz-Porter Co., Toronto.
- Straight Edges.**  
Steel Bending Brake Works, Ltd., Chatham, Ont.
- Straightening Machinery.**  
Baird Machine Co., Bridgeport, Conn.  
Bertrams, Ltd., Edinburgh, Scotland.  
National Mach. & Sup. Co., Hamilton.
- Structural Steel.**  
Hamilton Bridge Works Co., Hamilton, Ont.  
Lackawanna Steel Co., Lackawanna, N.Y.  
Owen Sound Iron Works Co., Owen Sound, Ont.
- Stud Driver.**  
Keystone Mfg. Co., Buffalo, N.Y.
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Lintz-Porter Co., Toronto.  
Toronto & Hamilton Electric Co., Hamilton.
- Switches, Railway.**  
National Mach. & Sup. Co., Hamilton.
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S. F. Bowser & Co., Fort Wayne, Ind.  
MacKinnon, Holmes Co., Sherbrooke, Que.
- Tanks, Steel.**  
John Inglis Co., Toronto.  
MacKinnon, Holmes Co., Sherbrooke, Que.  
Pleissville Foundry, Pleissville, Que.  
Toronto Iron Works, Ltd., Toronto.
- Tanks, Pressure.**  
Toronto Iron Works, Ltd., Toronto.
- Tanks, Water.**  
MacKinnon, Holmes Co., Sherbrooke, Que.
- Tank Wagons.**  
MacKinnon, Holmes Co., Sherbrooke, Que.  
Toronto Iron Works, Ltd., Toronto.
- Tapes, Measuring.**  
James Chesterman & Co., Ltd., Sheffield, Eng.
- Tapes, Friction.**  
Can. H. W. Johns-Manville Co., Ltd., Toronto.
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Independent Pneumatic Tool Co., Chicago, Ill.
- Tapping Machines and Attachments.**  
Baker Brothers, Toledo, O.  
John Bertram & Sons Co., Dundas.  
Garvin Machine Co., New York.  
The Geometric Tool Co., New Haven.  
Girard Machine & Tool Co., Philadelphia, Pa.  
Greenfield Tap & Die Corporation, Greenfield, Mass.  
J. H. Hall & Sons, Brantford, Ont.  
A. B. Jardine & Co., Hespeler.  
Landis Machine Co., Wapenboro, Pa.  
Manufacturers Equipment Co., Chicago, Ill.  
Modern Tool Co., Erie, Pa.  
Murchey Machine & Tool Co., Detroit.  
Niles-Bement-Pond Co., New York.  
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EACH MACHINE CAREFULLY REMANUFACTURED IN OUR OWN SHOP, TESTED AND GUARANTEED

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- 1-11" x 5' Rockford
  - 1-12" x 5' Reed
  - 1-12" x 5' Fay & Scott
  - 1-12" x 6' American
  - 1-12" x 6' Hendey
  - 2-14" x 6' Flatther
  - 1-14" x 6' Morris
  - 2-14" x 6' Pratt & Whitney
  - 1-14" x 6' American
  - 1-14" x 6' Walcott
  - 1-14" x 6' LeBlond
  - 2-15" x 6' LeBlond
  - 1-15" x 6' Davis
  - 1-15" x 6' Walcott
  - 1-16" x 6' Reed
  - 2-16" x 8' Lodge & Shippey
  - 1-16" x 8' Von Wyck
  - 1-16" x 8' Flatther
  - 1-16" x 8' Marshall
  - 1-16" x 8' LeBlond
  - 1-17" x 6' LeBlond
  - 2-17" x 7' Reed
  - 1-17" x 8' LeBlond
  - 1-18" x 6' Schumacher & Boye
  - 1-18" x 6' Walcott
  - 1-18" x 8' Greaves & Khusman
  - 1-18" x 8' Hendey
  - 3-18" x 8' American
  - 1-18" x 8' Davis
  - 1-18" x 8' Schumacher & Boye
  - 1-18" x 10' Bradford
  - 1-18" x 10' Davis
  - 1-18" x 14' New Haven
  - 1-19" x 8' Greaves & Khusman
  - 1-19" x 10' LeBlond
  - 1-19" x 10' Rahn
  - 1-19" x 12' Lodge & Davis
  - 1-20" x 8' American
  - 1-20" x 8' LeBlond
  - 1-20" x 12' Flatther
  - 1-21" x 8' Schumacher & Boye
  - 1-21" x 12' LeBlond Heavy Duty
  - 1-21" x 12' LeBlond
  - 1-21" x 12' Bradford
  - 1-22" x 12' Greaves & Khusman
  - 1-24" x 10' New Haven
  - 1-24" x 10' Schumacher & Boye
  - 1-24" x 12' Blaisdell
  - 1-25" x 10' American
  - 1-26" x 10' Greaves & Khusman
  - 1-26" x 12' Gleason
  - 1-26" x 12' Davis
  - 1-30" x 14' Lodge & Shippey
  - 1-32" x 16' Walcott
  - 1-40" x 18' Gleason
  - 1-42" x 12' Putnam
  - 1-45" x 18' New Haven
  - 1-60" x 10 1/2' Fitchburg
- HAND TURRET MACHINES**
- 1-15" x 5 1/2' American Fox
  - 2-15" Drees Precision Machines
  - 1-16" Walter & Swasey
  - 2-No. 1 Walter & Swasey
  - 2-No. 4 Windsor
  - 2-16" Jones & Luns L.
  - 1-18" x 6' Lodge & Davis
  - 1-18" x 6' Springfield

- 1-36" Eddy
  - 3-No. 1 Pratt & Whitney
  - 1-No. 2 Pratt & Whitney
  - 1-No. 2 1/2 Pratt & Whitney
  - 1-1" Wood Turret
  - 1-1" Barden's & Owen
  - 1-1" Wood Turret
  - 1-1 1/2" American
  - 1-1" Garvin
  - 2-2" Garvin
  - 2-2" x 2 1/2" J. & L. Goss
  - 1-1" x 4" J. & L. Goss
  - 1-1" x 3" J. & L. Goss
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- 8-16" Baker Bros.
  - 2-24" Bickford
  - 1-1 foot Built 2 spindle
  - 2-1 foot Built 4 spindle
  - 1-30" Baush
  - 1-1" Goss
  - 1-1" Rogers
  - 1-1" Brown & Sharpe
  - 1-37" Baush & Hales
  - 1-40" Bullard
  - 1-41" Bullard
  - 1-42" King
  - 1-43" Bullard
  - 1-44" King
  - 1-51" Gooden
- HORIZONTAL BORING MACHINES**
- 12-No. 1 2-spindle Pratt & Whitney Rifle Barrel Drillers
  - 1-Flatther
  - 1-No. 1 Niles
  - 1-N.W.K.
  - 1-Bentley
  - 1-Bass
  - 1-Bement, Miles & Co.
  - 1-Bement & Smith
  - 1-Sears
  - 1-Boss
- MILLERS**
- 2-No. 0 Brown & Sharpe
  - 1-No. 0 Owen
  - 1-No. 0 Cincinnati
  - 1-No. 15 Gleason
  - 1-No. 15 Bickford
  - 2-No. 20 Oesterlein
  - 1-No. 13 1/2 Garvin
  - 1-No. 2 A Brown & Sharpe
  - 1-No. 2-B Brown & Sharpe
  - 1-No. 2 H Brown & Sharpe
  - 2-No. 2 Cincinnati
  - 2-No. 3 Bement, Miles & Co.
  - 1-No. 28 Oesterlein
  - 1-No. 2 Kempsmith
  - 1-No. 34 Oesterlein
  - 1-No. 9 Kempsmith
  - 1-No. 3 Kempsmith
  - 2-No. 5 Kempsmith
- LINCOLN MILLERS**
- 5-No. 2 Pratt & Whitney
  - 7-No. 12 Pratt & Whitney

- 7-No. 1 Pratt & Whitney
  - No. 5 Bickford
  - 1-No. 6 Bickford
  - 1-No. 7 Bickford
  - 1-Brown & Sharpe
  - 1-No. 7 Bickford
  - 2-36" Chicago
  - 1-No. 2 Newton
  - 1-No. 4 New
  - 3-Carter & Hakes
  - 10-Michigan
- PLANERS**
- 1-21" x 21" x 5' Flatther
  - 1-21" x 21" x 6' Davis & Lee
  - 1-21" x 27" x 6' Walcott
  - 1-21" x 26" x 6' Flatther
  - 1-24" x 24" x 6' Pond
  - 1-26" x 27" x 6' Gray
  - 1-26" x 27" x 8' Gray
  - 1-24" x 21" x 8' Gray
  - 1-26" x 27" x 7' Gray
  - 1-26" x 27" x 6' Flatther
  - 2-26" x 26" x 7' Gray
  - 1-27" x 27" x 6' Gray
  - 1-27" x 27" x 7' Flatther
  - 1-28" x 28" x 6' Gray
  - 1-30" x 30" x 6' Gray
  - 1-30" x 30" x 8' Gray
  - 1-30" x 30" x 8' Flatther
  - 1-30" x 30" x 8' O
  - 1-30" x 30" x 10' Flatther
  - 1-32" x 32" x 10' G
- GRINDERS**
- 1-No. 11 Brown & Sharpe
  - 1-No. 11 Landis
  - 1-No. 8 Flatther & Walcott
  - 1-No. 10 Brown & Sharpe
  - 1-No. 10 Landis
  - 1-16" x 6" Landis
- RADIAL DRILLS**
- 1-2 American
  - 1-2 Fostick
  - 1-2 Fostick
  - 2-2 1/2' Gang
  - 1-2 Drees
  - 1-2 1/4' American
  - 1-2 1/2' Mueller
  - 1-3' Drees
  - 2-3' Fostick
  - 3-3' Prentice
  - 1-3' Goss
  - 1-3 1/2' Hamilton
  - 1-3 1/2' Bickford
  - 1-4' Drees
  - 1-4' Bickford
  - 2-5' Prentice
  - 1-5' Baush
  - 2-5' Western
  - 1-6' Bickford
  - 1-6 1/2' Baush

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Cleveland Twist Drill Co., Cleveland.  
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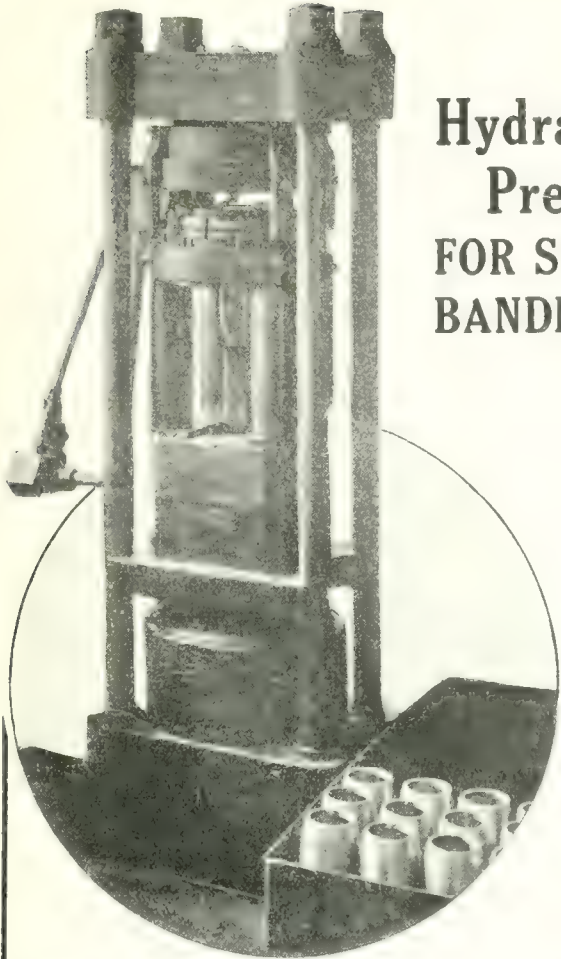
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### Strong, Simple, Reliable, Low Cost

Power is obtained from continuous running belt-driven pump located near the press and is applied to the ram underneath the table.

Table Rises and Forces Steel Taper Wedges, eight in number, up into the Hollow Steel Forging at the top, the wedges conforming to the shape of the shell and are thus pressed in equally against the copper band; pressure is then released, the shell is readily taken out.

Operates by lever shown on the left-hand side. Pressure gauge behind.

As this machine is a standard Hydraulic Press, it can be used in any other capacity.

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We also manufacture Loading Funnels, Ball-Bearing Tightening Nuts, Belt-Driven Loading Vibrators, Bench Vises.

We shall be pleased to submit prices and give any particulars required.

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Why go to the expense of buying new machines for the manufacture of

## SHELLS?

We have already shipped some 75 car-loads of

## Rebuilt Machine Tools

to CANADA since the outbreak of the war, with absolute satisfaction in each case.

If you need any equipment it will be to your advantage to get in touch with us as our facilities for furnishing rebuilt machinery are second to none on the continent.

**EVERY MACHINE WE BUY IS PUT THROUGH OUR OWN SHOPS AND COMES OUT IN ABSOLUTELY PERFECT ORDER—AND WE STAND BEHIND EVERY ONE WE SELL.**

The demand is enormous, but we are not taking advantage of the war by putting on exorbitant prices—our aim is a good, square deal to everybody all the time. You can often get something practically equal to a new machine at a very great saving in price.

As we carry a large stock, we can likely supply you from stock, or if we cannot do this, we will take your order for future delivery, specifying a definite time when we will supply you with such tools as you may require.

**New York Machinery Exchange**

50 Church St., New York

*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*



# Hendey Experimental 12" Lathe

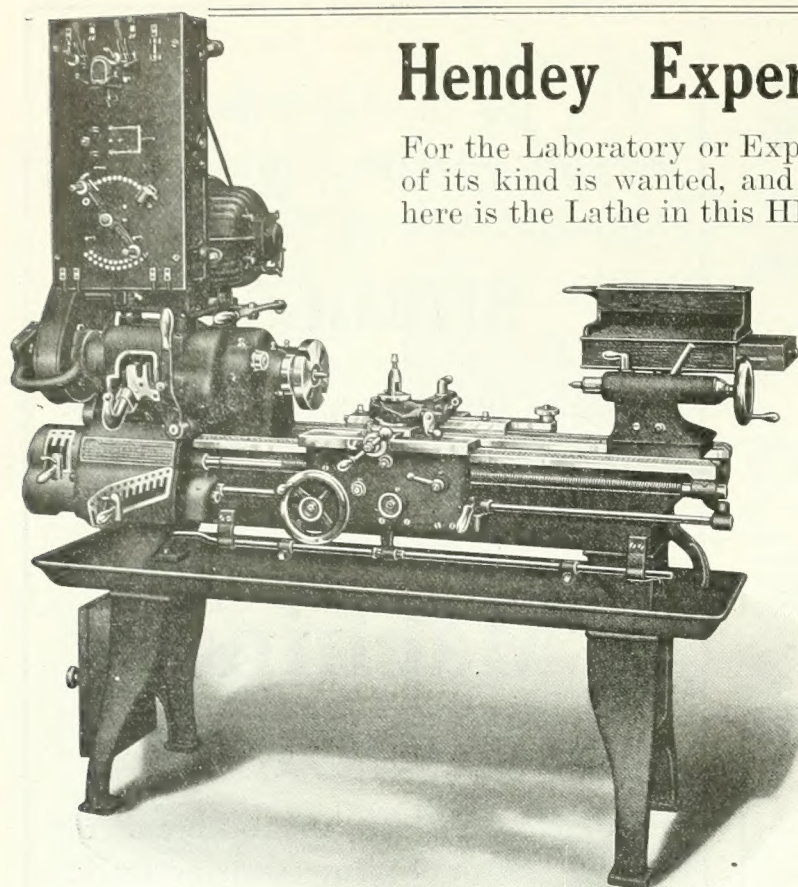
For the Laboratory or Experimental Department where the best of its kind is wanted, and each machine must be motor-driven, here is the Lathe in this HENDEY 12".

In addition to its complete regular equipment it has Small Tool Cabinet for operators' fine tools, also gear closet for extra gears to cut special threads.

*Write for Descriptive Matter*

**The  
Hendey Machine Co.**  
Torrington, Conn., U.S.A.

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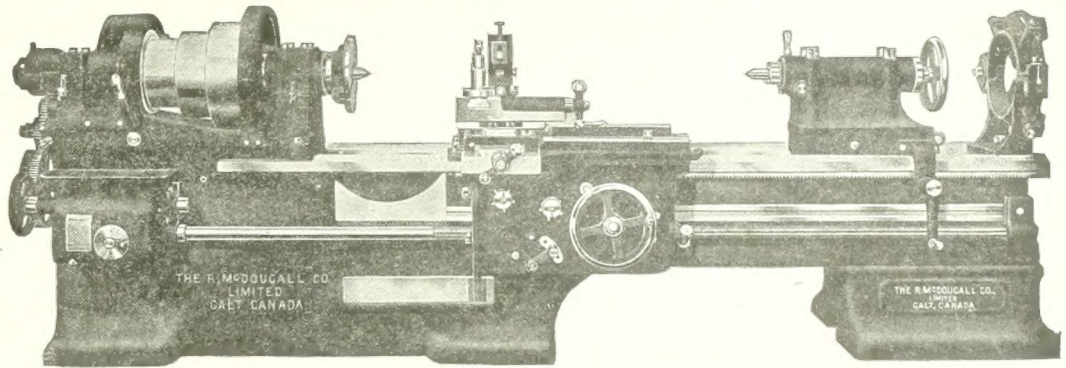
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Strength  
Accuracy  
Quality



Take a look at the next money you intend to invest in a Lathe.  
Then, take a look at the money's worth we offer you in our machine.  
Your money will soon come back to you in increased production and we  
will have the pleasure of having a satisfied user. Our machines are just as  
good as they look and they look good too.  
We invite the closest inspection.

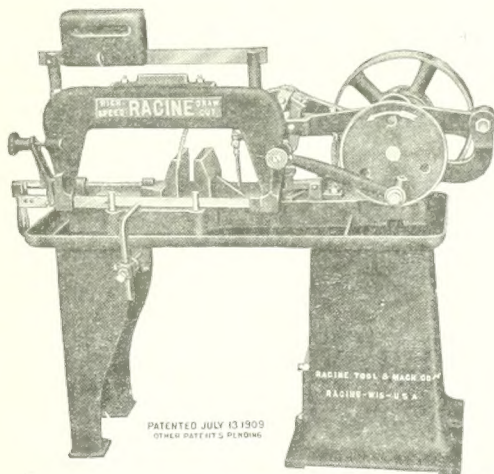
Particulars on request.

## The R. McDougall Company Limited

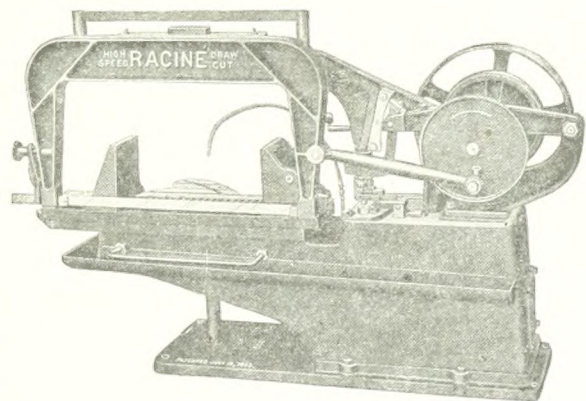
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6 in. MACHINE



12 in. MACHINE

The RACINE HIGH-SPEED METAL CUTTING MACHINE used in BATTERIES is the most Economical machine for cutting off steel billets for the manufacture of shells.

Estimated cost of cutting 500,000 3½" blanks, 50 per cent. carbon, using 30 No. 1 Racine Hack Saw Machines and Tungsten Hack Saw blades in 4½ months, including price of machines, saws, power, and labor, is 2½¢ per cut.

A greater capacity at lower cost of installation and up-keep, with a saving of over \$11,000.00 in material on the above quantity.

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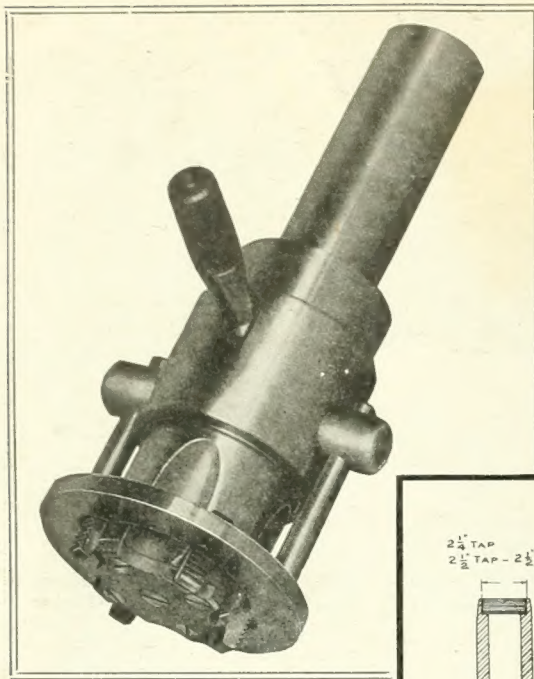
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are threading successfully  
all types and sizes of

## High Explosive Shells

English, French, Italian,  
United States and Russian.

### LARGE SHELLS

of 9.2" and  
12" diameter

are calling for improved  
and larger types of  
Tools to produce them.

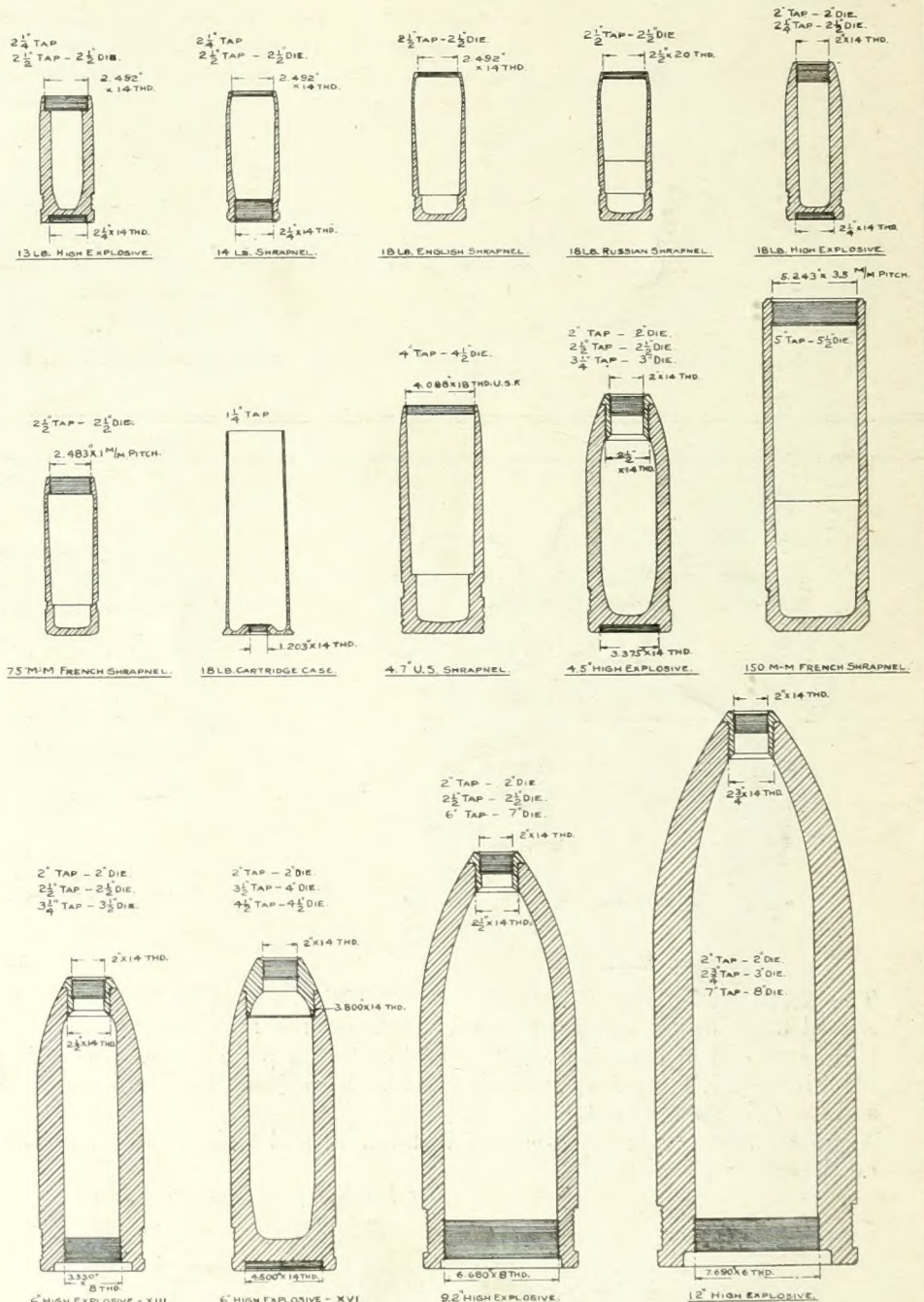
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